

Indian Institute of Management, Calcutta
M. N. Dastur & Co. Private Ltd., Calcutta

SURVEY
of
INDIA'S EXPORT POTENTIAL
of
MACHINE TOOLS

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SURVEY
OF
INDIA'S EXPORT POTENTIAL
OF
MACHINE TOOLS

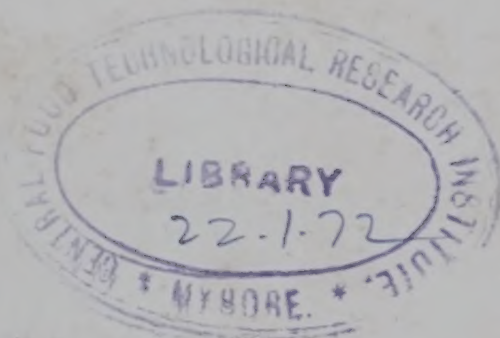
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VOLUME II

FOREIGN MARKET SURVEY REPORTS



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FOREIGN EXCHANGE RATES

<u>Country</u>	<u>Unit of currency</u>	<u>U.S. Cents per unit</u>	<u>Rupees per unit</u>
U.S.A.	Dollar	100.000	7.500
India	Rupee	13.333	1.000
Canada	Dollar	92.500	6.940
Japan	Yen	0.278	0.021
Australia	Dollar	112.000	8.400
New Zealand	Dollar	112.000	8.400
West Germany	Deutsche Mark	25.000	1.875
Italy	Lire	0.160	0.012
France	Franc	20.255	1.519
Spain	Pesetas	1.429	0.107
Yugoslavia	Dinar	8.000	0.600
U.A.R.	Pound	287.156	21.536
Kenya	Shilling	14.000	1.050
Nigeria	Pound	280.000	21.000
Thailand	Baht	4.808	0.361
Malaysia	Dollar	32.667	2.450
Singapore	Dollar	32.667	2.450
Ceylon	Rupee	16.800	1.260
Indonesia	Rupiah	10.000	0.750
South Vietnam	Piastre	0.847	0.064
Burma	Kyat	21.000	1.575
Cambodia	Riel	2.857	0.214
Philippines	Peso	25.641	1.923
South Korea	Won	0.356	0.027



WORLD PRODUCTION AND TRADE IN MACHINE TOOLS

WORLD PRODUCTION AND TRADE IN MACHINE TOOLS

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1. Statistics on World Production and Trade

Appendix 1 presents statistics compiled by American Machinist on world production and trade in machine tools, broken down by country, for 1964-67.

Most of the figures are accurate, but the statistics given for India are "rough estimates from fragmentary data", according to American Machinist, and a check reveals that they substantially overestimate India's production and export of machine tools.

Section 4 presents data from Indian sources and compares these with the American Machinist statistics to show India's role in world production and trade in machine tools.

2. World Production of Machine Tools

Table 1 below shows the level of world-wide production of machine tools for 1964-1967.

Production in 1967 is estimated at over \$ 5,932 million, a 6.1 percent increase over the production of \$ 5,590 million in 1966.

• Table 1

World Production of Machine Tools
(Value in current prices in millions of US dollars)

<u>Year</u>	<u>Production</u>	<u>Percentage increase over preceding year</u>
1964	4,754	-
1965	5,015	5.5%
1966	5,590	11.5%
1967	5,932	6.1%

Source: Appendix 1.

Table 2 shows the production of the top 10 machine tool producing countries in 1966-67. In 1967 these ten countries accounted for \$ 5,421 million, or 91 percent of world production. The U.S. ranked first with \$ 1,810 million, or 31% of the total, more than twice the production of the second-ranked country. The USSR and West Germany were second and third, with \$ 874 million and \$ 820 million respectively.

Table 2
Production of the Top Ten Producers of Machine
Tools, 1966 & 1967

(Value in millions of U.S. dollars)

Country	1966		1967		Percent Increase in 1967 over 1966
	Value	Percent of total	Value	Percent of total	
Total, all Countries :	5589.9	100.0	5932.4	100.0	+ 6.1
Total Top ten producers:	5049.3	90.5	5421.2	91.4	+ 7.4
United States	1712.8	30.7	1810.0	30.5	+ 5.7
U.S.S.R	812.0	14.5	874.0	14.7	+ 7.6
West Germany	897.3	16.1	820.0	13.8	- 8.6
Great Britain	417.0	7.5	440.0	7.4	+ 5.5
Japan	273.8	4.9	379.2	6.4	+38.4
France	235.7	4.2	269.0	4.5	+14.2
Italy	138.2	2.5	240.0	4.0	+73.6
Czechoslovakia	230.0	4.1	237.0	4.0	+ 3.0
East Germany	172.5	3.1	186.0	3.1	+ 7.8
Switzerland	160.0	2.9	166.0	2.8	+ 3.7

Source: Appendix 1

Table 3 gives the distribution of world production of machine tools by type of economy. As of 1967, the advanced market economies led with 73 per cent of the total, followed by the centrally planned economies of the Soviet Union and Eastern Europe with 24 percent. The four developing countries listed accounted for 2 percent, while China accounted for another 1 percent. Because of omissions, the share of the developing countries is somewhat understated.

Table 3

Production and Trade of Machine Tools by Economic Category, 1966-67

(Value in millions of US Dollars)

Economic Category	Production		Export		Import	
	1966	1967	1966	1967	1966	1967
Total, all countries:	5589.9 (100%)	5932.4 (100%)	1540.4 (100%)	1543.3 (100%)	1300.1 (100%)	1428.7 (100%)
Advanced Market Economies	4063.9 (72.7%)	4337.9 (73.1%)	1218.8 (79.1%)	1233.1 (80.2%)	887.2 (68.2%)	1081.2 (75.7%)
of which:						
US and Canada	1743.8 (31.1%)	1834.0 (30.9%)	187.7 (12.4%)	210.0 (13.7%)	254.2 (19.3%)	430.0 (30.3%)
Western Europe	2017.7 (36.1%)	2097.9 (35.3%)	975.1 (3.7%)	968.7 (63.1%)	554.1 (42.3%)	567.2 (39.9%)
Japan & Australia	302.4 (5.4%)	406.0 (6.9%)	56.0 (0.9%)	59.4 (3.9%)	78.9 (6.2%)	84.0 (5.6%)
Eastern Europe and Soviet Union	1362.2 (24.4%)	1450.4 (24.4%)	315.4 (20.4%)	301.8 (19.6%)	310.8 (23.9%)	269.6 (18.9%)
Developing Economies	113.8 (2.0%)	97.1 (1.6%)	6.2 (0.4%)	3.4 (0.2%)	102.1 (7.9%)	32.9 (2.3%)
China	50.0 (0.9%)	47.0 (0.8%)	- (-)	- (-)	- (-)	- (-)

Source: Appendix 1.

Note: Advanced Market Economies include: United States, West Germany, Great Britain, Japan, France, Italy, Switzerland, Spain, Sweden, Belgium, Australia, Canada, Austria, Netherlands, Denmark, Portugal.
 Eastern Europe and the Soviet Union include: Soviet Union, Czechoslovakia, East Germany, Poland, Hungary, Rumania, Yugoslavia, Bulgaria.
 Developing countries include: India, Brazil, Argentina, Mexico.

3. World Trade in Machine Tools

Table 4 shows the level of world trade (based on exports) in machine tools for 1956-67. Between 1956-58 and 1965-67 world trade in machine tools in current prices increased by two and a half times, and almost doubled in real terms.

Table 4

World Trade in Machine Tools, 1956-1967

(Value in current prices in millions of U.S. dollars)

<u>Year</u>	<u>Value</u>	<u>Percentage change from preceding year</u>
1956	513	+ 17
1957	641	+ 25
1958	614	- 4
1959	617	0
1960	753	+ 22
1961	1,083	+ 43.8
1962	1,229	+ 13.5
1963	1,199	- 2.5
1964	1,349	+ 12.5
1965	1,475	+ 9.5
1966	1,540	+ 4.4
1967	1,543*	+ 0.2*

Note: *In calculating exports for 1967, figures were not available for four countries which exported \$ 45.9 million in 1966.

Source: 1956-1963: US Department of Commerce, Business and Defence Services Administration, World Trade in Machine Tools, 1959-1960, 1961-1964.

1964-1967 : Appendix 1.

Table 5 shows the level of machine tool exports of the top ten exporting countries. The list of the top ten exporters is identical to the list of the top ten producers, but there are significant difference in the rankings. These ten countries accounted for 90-93% of total exports in 1964-1967.

Table 5

Exports of the Top Ten Exporters of Machine Tools
1964-67

(Value in millions of U.S. Dollars)

Country	1964		1965		1966		1967	
	Value	Percent of total	Value	Percent of total	Value	Percent of total	Value	Percent of total
Total, all countries:	1349.2	100.0	1474.5	100.0	1540.4	100.0	1543.3	100.0
Total, top ten countries:	1221.2	90.5	1330.0	90.2	1386.0	90.0	1432.6	92.8
United States	285.7	21.2	240.6	16.3	173.2	11.2	200.0	13.0
U.S.S.R	37.9	2.8	44.0	3.0	48.6	3.2	59.8	3.9
West Germany	390.0	28.9	400.0	27.1	486.8	31.6	440.0	28.5
Great Britain	105.9	7.9	136.2	9.2	122.0	7.9	129.0	8.4
Japan	17.9	1.3	35.7	2.4	52.6	3.4	55.7	3.6
France	58.8	4.4	62.7	4.3	66.4	4.3	71.6	4.6
Italy	40.0	3.0	80.8	5.5	87.2	5.6	112.0	7.3
Czechoslovakia	99.0	7.3	129.0	8.7	137.0	8.9	141.0	9.1
East Germany	79.0	5.8	82.0	5.6	86.2	5.6	92.5	6.0
Switzerland	107.0	7.9	119.0	8.1	126.0	8.2	131.0	8.5

Source: Appendix 1.

It is interesting to note that because of widely different changes in export performance, the percentage shares of some of the individual countries changed markedly. The outstanding changes in the pattern of world exports of machine tools is the decline in the level of U.S. exports and the rapid increase of exports from Japan and Italy.

Table 6

Change in Exports of the Top Ten Countries, 1964 - 1967

Country	Percentage change in value of Exports, 1967 over 1964.	Change in Percentage share of world Exports, 1967 over 1964.
Total, all countries :	14.4	-
United States	- 30.0	- 8.2
U.S.S.R	57.9	1.1
West Germany	10.0	- .4
Great Britain	21.8	.5
Japan	211.2	2.3
France	21.8	.2
Italy	180.0	4.3
Czechoslovakia	42.4	1.8
East Germany	17.1	.2
Switzerland	22.4	.6

Source: Appendix 1

It is also significant to note that the share of exports in total production, or the export orientation of the machine tool industry, varies widely between countries. Appendix 2 shows the ratio of exports to production for 1964 - 1967.

Most noteworthy is the fact that for many of the European countries, exports account for more than half of machine tool production. This is true not only of the small countries like Belgium, the Netherlands, and Denmark but also West Germany, the world's third largest machine tool producer. By contrast, in the four developing countries for which data is available, exports are less than ten percent of production, often a good deal less.

Appendix 3 shows the level of imports of machine tools of 29 countries for 1964 - 1967.

The pattern of imports is different from that of production and exports, and in particular is less concentrated. In 1966 the top ten producing and exporting countries accounted for 57.2 percent of the imports, compared to over 90% of the production and exports, in the 29 countries for which data is available. However, the top five importers - Canada, the U.S., Great Britain, France, and the U.S.S.R. - accounted for over half of all imports in 1967.

Appendix 3 also shows the share of imports in domestic consumption of machine tools for the 29 countries for 1964 - 1967. The most noteworthy feature of these statistics is that import

penetration of the U.S. market has increased substantially, from 3.8% of domestic consumption in 1964 to 11.5% in 1967. Also import is the fact that Canada, the largest importer of machine tools, imported 94% of its domestic consumption in 1967.

The statistics presented in Appendix 1 include only four developing countries, India, Argentina, Brazil and Mexico. Omission of the production and exports of the other developing countries is not serious since these countries have relatively little of either. However, the omitted countries do have significant imports of machine tools. Table 7 on the next page presents data on the imports of machine tools for 1964-1967 into five of the developing countries visited by our survey teams, plus the data on Argentina, Brazil, and Mexico from the American Machinist and data on India gathered from Indian sources. Recent data is not available for the other developing countries, but we have collected import data from UN sources for 1962-1965. These data are presented in Appendix 4.

Finally, data on imports by types of machine tools into various countries is presented in Appendix 5 for the years 1960-1965. This is the only detailed data available on imports of machine tools in terms of the various types of machines for the world market as a whole. The source of this data is a handbook of import statistics on machine tools published by Unione Costruttori Italiani Macchine Utensile (U.C.I.M.U.), the Italian Machine Tool Manufacturers' Association, in April 1967. U.C.I.M.U. do not give any details of

their data-sources. The individual country reports, which follow this section, also include data on imports, and, for that matter, on exports and domestic production as well, by types of machine tools for the various countries surveyed. The sources of this data are indicated at the relevant places in the individual reports. Any variation between the U.C.I.M.U. data of Appendix 5 and the data of the individual country reports must obviously be due to differences in data-sources although it is not possible to comment on this variation due to lack of knowledge on U.C.I.M.U's sources of data.

Table 7

Import of Machine Tools by Developing
Countries, 1964-1967

(Value in Million US dollars)

	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>
UAR ²	NA	3.9	6.2	NA
E. Africa ²	1.9	1.5	1.9	1.9
Kenya	1.4	.7	1.1	1.0
Uganda	.3	.4	.3	.6
Tanzania	.2	.5	.5	.3
Nigeria ²	NA	2.3	1.2	.9
Ghana ²	NA	.7	1.3	.5
Thailand ²	3.4	1.7	2.6	3.6
Argentina ¹	NA	NA	11.9	11.6
Brazil ¹	NA	NA	20.7	21.3
Mexico ¹	24.5	NA	NA	NA
India	66.2	70.4	54.7*	48.5

Source: 1 = Data gathered by Survey teams and presented in individual country reports.

2 = American Machinist

* = Converted from rupees at post devaluation rate.

4. India's Role in World Production and Trade in Machine Tools

The statistics presented by American Machinist considerably overestimate Indian production and trade in machine tools. Table 8 compares statistics from Indian data sources with those from the American Machinist. Depending on the exchange rate used, Indian production of machine tools at its highest point, in 1966, was between \$ 34.3 and \$ 54.1 million, and was \$ 28.7 million in 1967. The figures are a good deal less than the American Machinist estimates of \$ 63 million for 1966 and \$ 55 million for 1967. Assuming the rest of the American Machinist statistics are accurate, India ranked between 13th and 15th in production in 1966 and was 18th in 1967. This is in contrast to the often-quoted figure that India is 11th, which is based on the erroneous American Machinist data.

Similarly, while the American Machinist lists Indian machine tool exports at \$ 2.1 million in 1966, Indian exports of machine tools did not exceed \$.9 million in 1966 or 1967. American Machinist lists 26 countries whose annual machine tools exports for at least one year exceeded India's peak exports.

Table 9 presents Indian production and trade in machine tools for 1964-67. It will be seen that India accounted for .5% of world production of machine tools in 1967, and slightly more in 1966. Because Indian exports of machine tools are barely 3% of production compared to a world average of 24%, Indian exports accounted for less than .1% of world trade. By contrast, India still imports about 60% of its machine tools requirements, and its imports amount to 3-4% of world trade.

Table 8

Comparison of Estimates on Indian Production and Trade in Machine Tools, 1966-1967

	American Mechanist				Indian Data Sources					
	1966		1967		1966		1967			
	U.S. (Milli- ons)	Rs (Lakhs) Pre- deval. Rate	Post- deval. Rate	U.S. (Milli- ions)	Rs (Lakhs) Pre- deval. Rate	Post- deval. Rate	U.S. (Milli- ons)	Rs (Lakhs)		
Production	63.0	2338.8	4731.3	55.0	4131.0	54.1	34.3	2573.0	28.7	2158.0
Export	2.1	99.8	157.7	N.A.	N.A.	0.9	0.8	41.60 (pre-deval)	0.9	67.0
								60.02 (post-deval)		
Import	69.3	3298.7	5204.4	N.A.	N.A.	86.2	54.7	4104.0	48.5	3643.0

Note: Export statistics from Indian data sources relate to the fiscal years 1966/67 and 1967/68.

SOURCE: American Mechanist : Appendix Table 1

Indian Data Sources : Export data from EEPC

Production data from DGTD

Import data compiled from Monthly Statistics of the Foreign Trade in India.

Table 9

Indian Production and Trade in Machine Tools, 1964-67

	Production	Export ²	Export as percent of production	Import	Import as percent of apparent consumption ¹
1964	1890	17	0.9	3353	64.1
1965	2226	36	1.6	3232	59.6
1966	2578	(42	1.6	4104	61.8
		((pre-deval)			(pre-deval)
		(60	2.3		62.0
		((post-deval)			(post-deval)
1967	2158	67	3.1	3643	63.5

¹ Apparent consumption is taken as production less exports plus imports.

² Exports are for fiscal years 1964/65 to 1967/68. Data from EEPCC.

5. Barriers to Trade in Machine Tools

By comparison to many of India's exports, machine tools face relatively low trade barriers in potential markets. Trade restrictions are lower on capital goods like machine tools than on either simpler consumer goods or traditional manufacturers. In the developed countries, tariffs were generally about 10-20% before the Kennedy Round, but as a result of the Kennedy Round many of these countries will reduce tariffs to 7.5 to 15%. In the developing countries, with

the exception of a few which have indigenous production of machine tools, trade controls are usually much more lenient for capital goods than consumer goods because of their importance in economic development. In some with adequate foreign exchange, there are no restrictions on entry of machine tools.

Appendix 6 presents import restrictions on machine tools into selected foreign countries.

6. Export Subsidies in the Major Machine Tool Exporting Countries

6.1 Fiscal Incentives for Exports

In the advanced countries, which have achieved the greatest success in export of machine tools, government incentives in the form of cash subsidies, tax rebates, concessional prices of inputs, and special import privileges play a relatively minor role. Success in exporting depends not on subsidies but on the development of a machine tool industry with a competitive cost structure and low cost sources of supply. This is achieved by quality management and has been aided by Government policies which give relatively free access to imported inputs and do not shelter the industry from the discipline of competition with imports. These countries have sacrificed the security of a protected home market for the benefit of competition, and with it, lower cost machine tools for their domestic engineering industries and the ability to compete in lucrative export markets. On a world-wide basis, barriers to trade in machine tools are low

and the machine tools industry is highly export-oriented, exporting one-fourth of its production.

The one form of fiscal incentive which is common is the rebate of tariffs and sales taxes on inputs used in production of exports. It should be noted that cash subsidies and rebate of profit taxes is prohibited by the GATT.

6.2 Export Promotion

While the governments of advanced countries give only limited fiscal incentives to exports, they actively promote exports in other ways. These measures are designed primarily to cover over-head expenses in exporting, to reduce risks, and to assure that firms have access to adequate credit facilities.

First, they have highly developed government-financed facilities for market research. Market research is carried out not simply by ad hoc sales-cum-study teams spending a few days in a foreign country but on a continuing basis by permanent, commercially trained representatives stationed in the foreign markets.

Second, they undertake sales promotion efforts, with heavy reliance on government supported participation in trade exhibitions and often government-sponsored showrooms.

Third, some of these countries provide financial assistance and insurance to encourage firms to develop foreign markets, for example,

by deferment of taxes on income invested in foreign market research, sales promotion, or establishment of overseas distribution, with provision for waiver of the tax liability altogether if the venture is not successful.

Finally, export credit is often provided by the government, sometimes at subsidised rates, and availability of export insurance against political and other non-commercial risks is universal.

Appendix 7 Presents the information on export incentives and promotion in selected foreign countries.

World Machine Tool Production and Trade, 1964-1967
(Millions of US Dollars)

Country	1964				1965			
	Production		Trade		Production		Trade	
	Total	Outing	Forming	Export	Import	Total	Outing	Forming
United States	1194.3	874.5	332.6	285.7	35.8	1457.6	1047.8	409.8
Soviet Union	n	680.0	n	37.9	119.7	782.0	662.0	120.0
West Germany	757.6	512.8	244.8	390.0	129.0	840.3	560.0	280.0
Great Britain	340.5	NA	NA	105.9	93.1	393.7	294.2	96.5
Japan	304.6	252.3	52.3	a	63.2	268.2	195.4	72.8
France	232.7	181.5	51.2	58.8	99.2	225.4	175.8	50.6
Italy	162.0	124.0	42.0	40.0	41.0	117.0	89.0	25.0
Czechoslovakia	202.0	152.0	50.0	99.0	37.0	215.0	160.0	55.0
East Germany	157.5	100.8	56.7	79.0	NA	c	107.0	c
Switzerland	136.0	NA	NA	107.0	NA	140.0	-	-
Poland	c	53.5	c	18.0	c	60.0	c	c
India	44.0	44.0	b	0.5	71.0	52.5	52.5	b
Spain	50.5	45.0	5.5	7.4	21.0	52.5	52.5	5.5
China	c	70.0	NA	NA	NA	-	-	-
Sweden	46.0	NA	NA	25.3	NA	55.0	34.0	19.0
Hungary	c	27.0	b	a	5.5	c	30.0	b
Romania	c	23.5	v	n	30.0	c	14.0	v
Belgium	25.1	15.1	6.0	18.6	34.6	28.2	15.6	12.5
Australia	j	15.0	b	3.2	NA	j	29.0	b
Canada	23.8	25.5	b	8.3	109.0	c	21.0	c
Brazil	31.0	31.0	b	1.0	55.0	c	30.0	b
Argentina	15.1	9.7	6.4	1.9	6.1	c	15.5	c
Austria	13.2	8.7	4.5	8.3	16.4	c	10.8	c
Netherlands	11.6	NA	NA	6.2	9.0	12.7	-	2.5
Yugoslavia	v	9.0	NA	2.1	30.2	v	9.6	c
Denmark	9.9	NA	NA	4.0	NA	10.7	7.0	3.7
Belarus	-	-	-	-	-	7.1	7.1	b
Portugal	1.9	1.1	0.8	0.4	8.8	2.3	1.4	0.9
Mexico	-	-	-	-	-	0.5	0.3	0.2

Appendix - 1

Country	1966				1967			
	Production		Trade		Production		Trade	
	Total	Outing	Forming	Export	Import	Total	Outing	Forming
United States	1712.8	1231.9	480.9	173.2	137.2	1810.0	1380.0	480.0
Soviet Union	812.0	678.0	132.0	48.6	120.0	874.0	731.0	145.0
West Germany	897.3	591.8	295.5	486.8	87.8	820.0	550.0	270.0
Great Britain	417.0	324.7	92.5	122.0	106.5	440.0	342.0	98.0
Japan	273.8	212.3	61.5	52.6	35.6	279.2	305.5	73.7

Country	1966				1967			
	Total	Production Cutting	Forming	Trade Export	Total	Production Cutting	Forming	Trade Export
France	255.7	170.5	56.2	66.4	269.0	205.7	65.3	71.6
Italy	138.2	110.5	27.7	67.2	240.0	192.0	48.0	112.0
Czechoslovakia	e 230.0	o 172.0	e 58.0	o 137.0	e 237.0	o 177.0	o 60.0	e 141.0
East Germany	172.6	114.0	58.5	86.2	186.0	122.0	64.0	e 146.0
Switzerland	100.0	NA	NA	126.0	166.0	NA	NA	e 25.0
Poland	e 63.0	o 50.0	e 13.0	o 25.0	e 68.0	NA	NA	e 35.0
India	e 63.0	u 63.0	b 6.0	u 2.1	e 55.0	o 65.0	b 6.0	NA
Spain	u 58.0	u 52.0	u 4.0	u 7.8	o 50.0	NA	NA	NA
China	e 50.0	NA	NA	b 24.0	o 47.0	NA	NA	NA
Sweden	44.5	23.4	14.9	45.4	59.9	23.4	15.5	e 45.0
Hungary	e 53.0	o 53.0	b 6.0	o 11.0	55.0	55.0	b 6.0	NA
Romania	e 29.0	o 18.0	e 13.0	o 2.0	o 31.2	o 17.2	o 14.0	o 26.8
Belgium	26.0	14.0	12.0	22.0	27.0	15.0	12.0	o 25.0
Australia	j 28.0	j 6.9	j 21.7	j 5.4	j 26.8	j 6.4	j 20.2	j 37.4
Canada	31.0	23.0	8.0	14.5	24.0	16.0	8.0	j 220.0
Brazil	e 32.0	o 30.0	o 2.0	2.5	o 22.5	o 21.0	o 1.5	2.5
Argentina	18.3	10.1	8.2	1.6	19.1	10.6	8.5	0.9
Austria	18.6	12.7	5.9	12.9	17.4	11.2	6.2	11.6
Netherlands	14.4	NA	NA	9.7	14.7	NA	NA	15.3
Yugoslavia	15.2	12.4	2.8	5.6	13.2	10.9	2.5	12.5
Denmark	10.1	5.8	4.3	7.2	11.1	6.4	4.7	5.9
Bulgaria	e 7.7	o 7.5	b 6.0	NA	e 8.0	o 8.0	b 6.0	NA
Portugal	2.1	1.2	0.9	1.1	2.6	1.5	1.3	NA
Mexico	e 0.5	u 0.3	u 0.2	b 0.2	o 0.5	NA	NA	NA

NOTES:

- a - Cutting machines only
- b - Believed to be negligible
- c - Rough estimate from fragmentary data
- j - Year ended June 30
- u - Developed from data on numbers of machines
- v - Developed from data on weight of machines
- u - Unrevised
- NA - Not available

All values have been converted to United States dollars. All convertible currencies have been converted at average market rates for the year involved; controlled currencies have been converted at an estimate of a realistic rate rather than at the official rate.

Appendix - 2

Ratio of Export to Production of Machine Tools, 1964-67

Country	(in %)			
	1964	1965	1966	1967
Total, all countries	28.3	29.0	23.2	24.0
United States	23.9	16.5	10.1	11.0
Soviet Union	4.8	5.6	6.0	6.8
West Germany	51.4	47.6	54.2	53.7
Great Britain	31.1	35.5	29.2	29.3
Japan	5.9	13.3	13.2	14.7
France	25.3	27.7	28.2	43.5
Italy	24.1	72.1	63.1	46.7
Czechoslovakia	49.0	60.0	59.7 d	59.4 d
East Germany	50.2	50.0 d	50.0	49.7
Switzerland	78.6	85.0	78.8	78.9
Poland	34.6 d	40.0 d	39.7 d	NA
India	1.1	-	3.3	NA
Spain	14.7	12.9	13.9	NA
China	NA d	NA	Nil	NA
Sweden	93.0	53.8	54.2 d	73.9
Hungary	77.8	36.7 d	23.4 d	NA
Rumania	31.4 d	7.7 d	6.9 d	8.3 d
Belgium	74.1	77.3	84.6	77.7
Australia	21.3	6.9	11.9	13.8
Canada	34.8	25.0 d	46.8	41.7
Brazil	3.2	7.6 d	7.8 d	11.1 d
Argentina	11.8 d	5.8 d	8.7	4.7
Austria	62.9	75.9	77.7	76.3
Netherlands	55.4	55.1	67.4	68.0
Yugoslavia	23.3	59.3	36.8	44.7
Denmark	40.4	63.4	91.1	89.2
Bulgaria	NA	49.3	NA	NA
Portugal	21.1	34.8	52.4	50.0
Mexico	Nil	Nil	Nil	NA

Note: d = based on fragmentary data and hence subject to unusually large error of estimate.

NA = Not available

Source: Appendix 1

Import of Machine Tools by Country, 1964-67
(Value in Million US Dollars)

Country	1964			1965			1966			1967		
	Value	Percent of world imports	Ratio of imports to consumption	Value	Percent of world imports	Ratio of imports to consumption	Value	Percent of world imports	Ratio of imports to consumption	Value	Percent of world imports	Ratio of imports to consumption
Total, all countries	1052.6	100.0	.236	1195.7	100.0	.235	1500.1	100.0	.243	1428.7	100.0	.245
USA	35.8	3.4	.058	56.3	4.7	.044	137.2	10.6	.082	210.0	14.7	.115
Soviet Union	119.7	11.4	.137	119.0	9.9	.159	120.0	9.2	.155	119.8	8.4	.136
West Germany	129.0	12.3	.259	97.0	8.1	.169	87.8	6.8	.178	58.0	4.1	.132
UK	93.1	8.8	.284	94.0	7.9	.267	106.5	8.2	.265	154.0	10.8	.341
Japan	65.2	6.0	.181	51.1	4.3	.180	33.6	2.8	.132	46.8	3.3	.128
France	94.2	8.9	.364	88.1	7.4	.350	98.3	7.6	.367	117.5	8.2	.372
Italy	41.0	3.9	.246	35.7	2.8	.519	57.7	4.4	.531	92.0	6.4	.418
Czechoslovakia	27.0	3.5	.265	47.0	3.8	.553	47.0	3.6	.536	45.0	3.2	.519
East Germany	NA	NA	NA	25.0	2.1	.234	25.0	1.9	.225	25.0	1.8	.211
Switzerland	NA	NA	NA	38.0	3.2	.760	30.0	2.3	.468	35.0	2.5	.500
Poland	38.0	3.6	.152	59.0	3.2	.470	42.0	3.2	.231	NA	NA	NA
India	71.0	6.7	.620	67.2	5.6	.565	69.3	5.5	.532	NA	NA	NA
Spain	21.0	2.0	.527	26.0	2.2	.539	41.6	3.2	.463	NA	NA	NA
China	NA	NA	NA	NA	NA	NA	NA	NA	NA	45.0	3.2	.489
Sweden	NA	NA	NA	50.2	4.2	.672	43.4	3.3	.681	35.7	2.4	.764
Hungary	5.5	0.5	.478	5.5	0.5	.224	5.5	0.4	.200	NA	NA	NA
Romania	30.0	2.9	.583	25.0	2.1	.531	28.0	2.2	.510	28.8	2.0	.501
Belgium	34.6	3.3	.841	50.5	2.6	.826	31.1	2.4	.885	25.0	1.8	.806
Australia	NA	NA	NA	49.0	4.1	.654	45.3	3.5	.652	37.4	2.6	.611
Canada	109.0	10.4	.875	96.6	8.1	.821	117.0	9.0	.876	220.0	15.4	.940
Brazil	55.0	5.3	.647	55.0	4.6	.685	20.7	1.6	.412	21.3	1.5	.515
Argentina	6.1	0.6	.300	7.5	0.6	.251	11.9	0.9	.416	11.6	0.8	.369
Austria	16.4	1.6	.789	16.9	1.4	.840	21.4	1.6	.852	15.7	1.1	.792
Netherlands	9.0	0.8	.776	10.1	0.8	.218	11.7	0.9	.713	12.5	0.9	.728
Yugoslavia	30.2	2.9	.801	25.4	2.1	.832	45.5	3.3	.818	51.0	3.6	.874
Denmark	NA	NA	NA	16.4	1.4	.820	15.2	1.2	.844	15.0	1.0	.925
Belarus	NA	NA	NA	7.9	0.7	.687	NA	NA	NA	NA	NA	NA
Portugal	8.8	0.8	.854	7.0	0.6	.825	9.5	0.7	.905	9.0	0.6	.855
Mexico	NA	NA	NA	9.5	0.8	.950	0.2	NA	NA	NA	NA	NA

NOTE: NA - Not Available
Consumption of Machine Tools is taken as production plus imports less exports.
Source: Appendix 1

Import of Machine Tools by Developing Countries, by Country, 1962-65
(Value in \$ US million)

Country	Y E A R			
	1962	1963	1964	1965
Brazil	NA	32.4	12.4	13.0
Colombia	NA	NA	6.6	10.6
Kenya	NA	NA	1.4	0.7
Lebanon	0.8	0.9	1.7	2.8
Mexico	16.5	14.1	33.9	35.9
Morocco	2.0	2.3	3.4	NA
Pakistan	NA	3.9	4.4	5.7
Turkey	4.3	5.5	6.3	6.6

Source: UN Department of Economic and Social Affairs, Yearbook of
International Trade Statistics 1965.

Local currencies converted to dollars on basis of exchange
rates given in IMF, International Financial Statistics.

IMPORTS BY TYPES OF MACHINE TOOLS
INTO VARIOUS COUNTRIES : 1960-65

Source: Statistiche Delle Importazioni Di Macchine Utensili Di 53
Paesi, U.C.I.M.U.*, Milano, April 1967.

* U.C.I.M.U. is the Italian Machine Tool Manufacturers' Association.

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Imports into Austria, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965 (1 Semester)		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Revolver Automatic Lathes	339	1027	3	389	1252	3	425	1561	3	290	951	3	216	1123	5	84	408	5
2. Other Lathes	782	1241	2	1118	1815	2	819	1764	2	1103	1952	2	296	1119	3	163	691	4
3. Milling Machine	1182	2424	2	804	1929	2	870	2396	3	788	1928	2	484	2086	4	208	869	4
4. Planing, Shaping and Broaching Machine	348	407	1	398	539	1	824	709	1	424	655	2	131	456	3	60	226	4
5. Grinding Machine	850	2225	3	1246	3308	3	1146	3575	3	843	2586	3	2859	3079	1	1285	1058	0.8
6. Reaming, Drilling and Boring	910	1582	2	584	897	2	638	1360	2	487	834	2	1017	1353	1	446	425	1
7. Sawing and Filing	283	475	2	273	451	2	312	559	2	277	504	2	1152	572	0.5	576	228	0.4
8. Gear Cutting	34	107	3	101	230	2	18	77	4	24	68	3	8	23	3	1	1	1
9. Other Machine Tools for Transfer Lines	92	238	3	104	314	3	188	478	3	126	418	3	181	401	2	88	105	1
10. Sheet Working Machines	671	909	1	724	997	1	723	1098	2	651	1060	2	1291	855	0.7	981	350	0.4
11. Forging and Stamping	220	163	1	305	275	0.9	84	81	1	157	97	0.7	60	127	2	34	32	0.9
12. Presses	1880	2197	1	2211	2881	1	1285	1870	1	740	930	1	417	1296	3	256	471	2
13. Other Machine Tools	1253	2930	2	1314	3164	2	1618	3880	2	1329	3452	3	425	3548	8	4492	1080	0.2
Total	8865	15735	2	8577	18062	2	8648	19208	2	7219	15434	2	8637	16048	2	8032	5942	0.7

Imports into Greece, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Lathes & Milling Machines	495	634	1	625	775	1	845	1202	1	1145	1670	1	1394	2127	2	789	1168	1
2. Other Metal Outfitting Machines	1408	1827	1	770	1171	2	1058	1412	1	1539	2086	2	1964	2956	1	1642	2594	1
Total	1901	2261	1	1395	1946	1	1903	2614	1	2484	3756	2	2358	5083	2	2451	3562	1

Imports into England, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Reaming - Vertical	-	1752	-	-	1802	-	-	1950	-	-	1921	-	-	4086	-	-	706	-
2. Other Reaming Machines	-	2125	-	-	5380	-	-	3827	-	-	4446	-	-	4245	-	-	2463	-
3. Grinding, Honing and Polishing Machine	-	12285	-	-	14175	-	-	12998	-	-	11476	-	-	16268	-	-	8198	-
4. Vertical & Revolving Lathes	-	-	-	-	5703	-	-	2878	-	-	2561	-	-	3819	-	-	2012	-
5. Other Lathes	-	4703	-	-	8359	-	-	7005	-	-	6906	-	-	8817	-	-	2892	-
6. Milling	-	8737	-	-	11612	-	-	13825	-	-	15086	-	-	12659	-	-	6895	-
7. Sawing	-	-	-	-	-	-	-	894	-	-	791	-	-	1359	-	-	714	-
8. Threading & Screwing	-	1519	-	-	1539	-	-	1177	-	-	1776	-	-	1964	-	-	1514	-
9. Presses for Shaping	-	-	-	-	-	-	-	852	-	-	417	-	-	1052	-	-	205	-
10. Machines for Working Metals	-	5054	-	-	5475	-	-	4332	-	-	1667	-	-	1827	-	-	1595	-
Total	-	36175	-	-	48045	-	-	49765	-	-	45067	-	-	58036	-	-	26782	-

Imports into Belgium, 1961-65
(Value in '000 US Dollars)

	1961			1962			1963			1964			1965		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
1. Revolver and Automatic Lathes	605	1967	3	748	5173	4	579	2693	5	730	3708	5	281	860	3
2. Other Lathes	865	1425	1	632	1701	3	539	1646	3	732	1775	2	209	728	3
3. Reaming Machines	65	752	9	89	950	11	98	393	4	145	1349	9	31	237	8
4. Planing Machines	88	116	2	45	244	5	49	875	18	55	452	9	7	21	3
5. Sawing and Cutting Machines	1474	651	0.4	1334	990	0.7	1273	722	0.6	1640	1042	0.6	632	307	0.5
6. Broaching Machines	2422	760	0.3	268	666	2	314	316	1	335	470	1	104	139	1
7. Milling Machines	697	2694	4	722	2484	3	755	2777	4	673	2342	3	243	912	4
8. Boring Machines	1148	602	0.5	1041	922	0.9	1069	661	0.6	1675	974	0.6	463	364	0.8
9. Drawing Machine	25	217	9	46	93	2	1	47	47	25	147	6	1	103	103
10. Gear Cutting Machines	85	326	4	51	314	6	58	326	6	144	1365	9	20	167	8
11. Forging and Stamping	8	86	11	55	193	4	40	68	2	41	322	8	10	133	13
12. Presses	623	1550	2	765	1071	1	819	2669	3	1070	4641	4	409	2097	5
13. Sharpening, Polishing, Honing, Lapping	5490	3377	0.6	2996	5108	1	4943	3194	0.6	5896	4852	0.8	2451	979	0.4
14. Sheet Working Machines, Wire Drawing, Strips, Rolling and Carving Machine	4515	2310	0.5	4005	3253	0.8	4895	2983	0.6	6537	3691	0.6	3634	1477	0.4
Total ..	18198	16843	0.9	12798	19102	1	15450	19370	1	19798	27130	1	8495	8544	1

Imports into Federal Republic of Germany, 1961-65
(Value in '000 US Dollars)

Item	1961			1962			1963			1964			1965		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value
1. Lathes	-	14540	-	-	15426	-	-	6903	-	-	7767	-	-	6520	-
2. Automatic Revolver Lathes	-	11250	-	-	9305	-	-	4782	-	-	5580	-	-	7031	-
3. Sawing and Notching	-	821	-	-	747	-	-	640	-	-	713	-	-	943	-
4. Rectifying, Polishing and Lapping	-	15148	-	-	16058	-	-	9789	-	-	11190	-	-	15363	-
5. Gear Cutting	-	4992	-	-	6762	-	-	4394	-	-	4198	-	-	6105	-
6. Other Machines for Removal of Chips	-	3082	-	-	10822	-	-	1004	-	-	1282	-	-	3236	-
7. Hammers	-	1782	-	-	3724	-	-	1866	-	-	2292	-	-	2829	-
8. Presses	-	4572	-	-	6512	-	-	5332	-	-	5193	-	-	4598	-
9. Presses - Hydraulic	-	2017	-	-	3648	-	-	1625	-	-	2195	-	-	2763	-
10. Machines for Working Pressed Plates	-	2998	-	-	3230	-	-	2532	-	-	3406	-	-	4258	-
11. Filing Machines	-	3978	-	-	3923	-	-	3229	-	-	4600	-	-	4582	-
12. Presses for Scraps	-	1159	-	-	1203	-	-	1089	-	-	809	-	-	2014	-
13. Other Metal Forming Machines	-	473	-	-	658	-	-	476	-	-	679	-	-	1454	-
14. Planing, Shaping and Broaching	-	1779	-	-	1886	-	-	903	-	-	1539	-	-	1493	-
15. Drilling	-	6241	-	-	6507	-	-	4692	-	-	5367	-	-	8082	-
16. Milling	-	11207	-	-	16822	-	-	10177	-	-	10484	-	-	10000	-
Total	-	58206	-	-	104615	-	-	58563	-	-	67491	-	-	85835	-

Imports into Ireland, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
1. Metal Cutting Machines	6641	498278	75	6390	576444	90	10586	1011553	96	15102	1404909	95	25603	2049090	87	4657	520002	112
2. Metal Forming Machines	17271	820330	48	26291	1248195	47	97092	4624401	47	52581	2932295	56	55688	2001319	37	17449	573099	21
Total	23912	1318608	55	32081	1824539	56	106278	5635954	52	67683	4337194	64	77211	4070415	52	23904	607400	40

Imports into Yugoslavia, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
1. Lathes	965	777	0.8	1146	1058	0.9	1661	1894	1	1772	1907	1	2273	2451	1	937	655	0.7
2. Planing and Milling	499	404	0.8	522	471	0.9	1587	1542	1	2016	1825	0.9	1805	1629	0.9	574	401	0.7
3. Boring	512	397	0.8	502	453	0.9	958	929	1	1570	1457	0.9	1729	1295	0.7	565	405	0.7
4. Grinding	661	580	0.9	731	669	0.9	820	963	1	968	1192	1	1785	1732	1	625	417	0.7
5. Threading	40	35	0.9	235	200	0.9	225	196	0.9	105	106	1	77	119	2	16	14	0.9
6. Gear Cutting	81	125	2	50	69	1	159	285	2	199	225	1	165	183	1	32	22	0.7
Total	2758	2317	0.8	3186	2880	0.9	5609	5809	1	6632	6710	1	7834	7409	0.9	2749	1894	0.7

Imports into Norway, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
1. Lathes	629	1191	2	-	-	-	716	2482	3	635	1796	3	746	2098	3	320	671	3
2. Multiple Mendrel Drilling	42	40	0.6	38	63	2	25	68	3	109	66	0.6	44	9	0.2	15	162	11
3. Other Drilling	604	443	0.6	830	621	0.7	1427	572	0.4	804	479	0.6	726	414	0.6	534	208	0.6
4. Milling	192	433	2	309	721	2	346	1091	3	289	782	3	296	880	3	170	582	3
5. Grinding	2851	523	0.2	3287	656	0.2	2525	813	0.3	4319	787	0.2	2757	430	0.2	2856	363	0.1
6. Threading	154	91	0.7	119	180	2	129	100	0.8	87	65	1	91	78	0.9	56	72	1
Total	4732	3721	0.7	4601	2211	0.5	5156	5196	1	6213	3975	0.6	4642	318	0.6	3583	2271	0.6

Imports into Holland, 1961-65
(Value in '000 US Dollars)

Item	1961			1962			1963			1964			1965		
	Units	Value	Average value	Units	Value	Average value	Units	Value	Average value	Units	Value	Average value	Units	Value	Average value
1. Automatic and Semi-Automatic Lathes	378	1943	5	355	2237	6	251	1832	7	247	1427	8	113	798	7
2. Other Lathes	1766	5233	4	1908	5546	3	1748	4705	3	1775	5985	3	853	2034	2
3. Boring	66	806	12	80	1466	18	50	888	18	82	1639	20	31	1279	41
4. Planing	198	336	2	134	404	3	102	222	2	102	525	5	31	82	3
5. Sawing and Outting	1626	919	0.6	1569	1022	0.7	1403	858	0.6	1626	1021	0.6	796	540	0.7
6. Filing, Shaping & Brooming	243	368	2	330	402	1	242	330	1	117	183	2	69	109	2
7. Milling	1038	2647	3	1014	3149	3	998	3271	3	842	2729	3	470	1240	3
8. Boring	2974	1886	0.6	2768	1838	0.7	2596	2161	0.8	3125	2310	0.7	1279	901	0.7
9. Other Machines for Transfer Lines	8412	3488	0.4	8441	3807	0.5	7135	3477	0.5	10297	3338	0.3	4806	1488	0.3
10. Gear Outting	36	270	8	47	360	8	44	465	11	36	345	10	12	268	22
11. Presses	2185	2809	1	1728	3149	2	813	2322	3	1020	4226	4	509	2031	4
12. Rolling, Centering, Bending, Shearing and Straightening	6343	3157	0.5	6004	4126	0.7	6529	3945	0.6	6965	4291	0.6	4036	2001	0.5
13. Hammers, Forging and Stamping	1688	2941	2	308	272	10.9	229	202	0.9	311	221	0.7	171	63	0.4
Total	37931	26815	1	24866	27838	1	22140	24306	1	26845	26240	1	12576	16844	1

Imports into Portugal, 1961-65
(Value in '000 US Dollars)

1. Metal Outting Machines

- 3575 -

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Imports into France, 1960-64
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964		
	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average
1. Parallel Lathes (Below 5000 kg)	801	1181	1	646	905	1	1058	1715	2	1455	2466	2	1145	1902	2
2. Parallel Lathes (Over 5000 kg)	897	1018	2	1018	2128	2	1799	5824	2	1996	4478	2	1871	3764	2
3. Semi-Automatic Lathes (Up to 5000 kg)	204	809	2	558	957	3	291	909	3	287	779	3	171	540	3
4. Semi-Automatic Lathes (Over 5000 kg)	95	288	5	140	406	2	204	658	3	162	578	4	182	480	4
5. Vertical Lathes (Below 25000 kg)	616	802	1	389	569	1	211	230	1	1095	1856	2	74	447	2
6. Vertical Lathes (Over 25000 kg)	423	720	2	452	916	2	719	1557	2	886	1871	2	74	740	2
7. Automatic Lathes (Above 5000 kg)	994	3220	3	1372	4861	4	1007	5840	3	1608	5251	3	151	1841	4
8. Other Lathes	107	293	3	85	344	4	78	318	4	119	455	4	191	502	4
9. Thread Rolling Machines	370	816	5	269	1134	4	364	1239	3	278	990	4	270	1543	4
10. Reaming (Up to 10000 kg)	534	923	2	565	1053	2	1185	2134	2	1205	3013	3	1472	2193	2
11. Reaming (Over 10000 kg)	289	783	3	497	2165	4	434	1471	3	670	2109	3	642	970	4
12. Radial Drilling	249	338	1	200	456	2	507	675	1	556	545	2	449	11	1
13. Other Drilling	342	1230	4	709	3246	4	486	1961	4	457	2070	5	101	437	4
14. Funneling Machines	207	900	5	362	1078	4	484	2150	4	595	2957	5	174	840	5
15. Milling - Moving (Below 5000 kg)	673	903	1	575	1460	3	512	1142	2	260	648	2	110	541	4
16. Milling - Moving (Above 5000 kg)	305	842	3	535	984	3	512	1638	3	578	1676	3	82	1403	3
17. Milling - Fixed (Above 5000 kg)	114	522	3	180	595	3	172	583	3	302	837	3	211	735	3
18. Automatic Lathes (Up to 3000 kg)	880	1778	5	556	2757	5	773	5853	5	641	3428	5	689	2905	5
19. Milling	23	76	5	27	121	4	240	354	4	217	522	2	146	551	3
20. Planing (Below 10000 kg)	147	171	1	419	417	1	558	571	1	381	428	1	745	948	1
21. Planing (Above 10000 kg)	40	76	2	51	130	3	71	169	2	129	128	1	108	196	2
22. Sawing (Above 3000 kg)	117	143	1	124	164	1	75	122	2	108	156	1	189	185	1
23. Grinding	786	2533	3	853	2953	3	364	1239	3	278	886	3	349	1445	4
24. Grinding (Below 10000 kg)	592	1208	2	640	2155	3	1226	3048	2	1150	2899	3	780	2442	3
25. Grinding (Above 10000 kg)	2082	7536	4	2054	10216	4	5112	12175	4	3443	13026	4	2191	13160	4
26. Broaching (Up to 10000 kg)	61	106	2	98	282	3	122	305	2	219	42	3	266	704	3
27. Broaching (Above 10000 kg)	74	208	3	185	600	3	127	415	3	145	472	3	203	975	4
28. Tooth Cutting (Between 1000 - 10000 kg)	384	1430	4	512	1824	4	609	2497	4	635	2777	4	688	2773	4
29. Tooth Cutting (Above 10000 kg)	326	815	3	590	1176	3	91	356	4	206	457	2	262	693	3
30. Tooth Cutting (Up to 1000 kg)	22	135	7	29	233	8	51	454	9	-	-	-	50	900	6
31. Sawing and Cutting	459	969	2	608	1275	2	916	1737	2	935	2323	2	844	1858	2
32. Other Machine Tools	116	455	4	236	980	4	186	789	4	249	1202	3	106	1055	5
33. Hydraulic Machines	1025	1871	2	-	-	-	-	-	-	-	-	-	-	-	-
34. Forging and Stamping (Above 50000 kg)	328	500	2	580	1142	2	317	517	2	728	1506	2	559	700	2
35. Presses - Mechanical	2991	4463	1	3143	5305	2	3008	6294	2	3027	6321	2	3060	7289	2
36. Milling with Fixed Movement (Below 5000 kg)	632	1125	2	240	523	2	234	594	2	433	1358	3	555	1273	2
37. Milling - Special	746	2181	3	542	2108	4	009	2841	3	1141	4757	4	1533	6942	4
38. Grinding	14	16	1	19	29	2	28	54	2	20	51	2	36	43	1
39. Grinding	60	145	2	76	208	3	124	293	2	118	273	2	65	173	3
40. Straightening, Centering, Bending, Straightening Machines	816	1387	2	1802	2622	1	1003	2379	2	1201	2993	2	1159	2574	2
41. Forging and Stamping (Above 50,000 kg)	467	360	0.8	371	419	1	499	597	1	572	655	1	527	864	2
Total	19796	45656	2	22415	60889	3	25318	69655	3	28235	80565	3	27470	81950	3

Imports into Spain, 1961-65
(Value in '000 US Dollars)

Item	1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Parallel Lathes (Below 5 tons)	52	10,189	52.61	87	13,707	285	101	27,927	2771	56	15,421	2754	50	13,050	2650
2. Parallel Lathes (5 - 10 tons)	-	-	-	15	6,788	285	51	117,144	2297	18	38,78	2181	11	41,183	3789
3. Parallel Lathes (Above 10 tons)	59	58451	822	154	243,082	1580	174	505,404	1642	75	96,078	1810	-	-	-
4. Semi-Automatic Turret Revolver Lathes (Above 10 tons)	45	11,2125	2008	70	247,041	3527	51	1,007,57	3270	34	1,261,00	3711	15	70,087	4572
5. Semi-Automatic Turret Revolver Lathes (Below 10 tons)	193	550,895	2882	100	476,212	2845	154	505,908	3308	82	5,077,10	3202	45	1,97,050	2245
6. Automatic Lathes (Type 0.7 tons)	1	4925	4925	2	5885	2942	12	46,828	3902	17	68,909	5000	11	68,972	5916
7. Automatic Lathes (0.9 - 1.5 tons)	58	289,045	5822	81	404,149	4999	90	774,714	8609	82	4,17,920	5149	38	250,705	6581
8. Automatic Lathes (Above 1.5 tons)	287	1,04,800	3645	541	1,87,882	3472	710	2,85,779	4024	534	2,27,771	4244	489	1,86,887	3820
9. Vertical Lathes	129	28,700	2056	152	1,00,779	1386	201	60,849	3027	286	62,404	2183	94	2,01,400	2137
10. Special Lathes	68	28,387	2032	240	442,720	1800	585	1,41,710	2413	819	1,75,995	3368	19	47,418	2493
11. Other Lathes (Below 5 tons)	45	13,4757	2065	25	8,705	3481	64	11,0297	1725	17	5,7449	3379	9	2,509	2810
12. Other Lathes (Above 5 tons)	258	847,302	2191	95	3,06,12	3211	99	21,185	2140	93	1,60,185	1723	17	4,800	2832
13. Turret Lathes	28	74,123	2647	84	2,57,382	3061	68	5,17,700	4754	82	2,44,079	2904	14	6,182	4384
14. Planing and Shaping (Type 10 tons)	158	25,8971	1641	470	1,50,483	2350	516	1,57,140	3048	284	981,115	2904	192	1,51,773	7923
15. Planing and Shaping (Type 10 tons)	50	20,240	4048	85	1,17,700	1385	14	4,85,55	3464	25	61,164	2445	13	6,47,79	4923
16. Planing and Shaping (Above 10 tons)	150	1,51,731	1012	66	51,002	1368	407	5,49,16	1352	155	1,97,180	1277	234	2,1,007	745
17. Planing and Shaping (Type 5 tons)	5	11,118	2223	17	5,870	3455	15	5,02,75	3345	3	750	250	-	-	-
18. Planing and Shaping (Type 5 tons)	-	-	-	60	1,18,928	1982	16	2,10,88	1342	25	57,110	2298	-	-	-
19. Planing and Shaping (Type 5 tons)	94	24,435	2593	172	4,18,703	2431	164	5,02,403	3049	262	8,06,513	3043	75	2,48,38	3419
20. Planing and Shaping (Type 5 tons)	84	5,60,898	4171	211	7,7,774	3680	219	8,86,760	3950	225	5,61,002	5627	129	4,1,113	5583
21. Milling (Over 5 tons)	115	2,55,946	2224	210	5,17,024	2468	518	11,92,814	2285	212	6,47,146	3035	207	5,47,719	2594
22. Planing and Shaping (Type 7.5 t)	138	9,82,27	7045	75	2,87,719	3838	-	-	-	26	4,7,110	1748	84	1,1,005	1383
23. Planing and Shaping (Type 7.5 t)	61	1,04,803	1718	122	5,1,124	2461	89	2,24,191	2519	84	1,04,800	3036	81	2,7,107	3384
24. Other Milling	55	1,34,724	2450	27	5,92,11	3671	99	2,21,815	2285	107	2,50,882	2342	53	6,1,113	2430
25. Rectifying, grinding, honing and polishing (Type 5 tons)	313	1,22,562	4005	280	9,01,08	3222	272	8,12,05	3354	297	1,00,550	3365	98	2,7,127	3659
26. Rectifying, grinding, honing and polishing (Type 5 tons)	302	79,2018	2619	376	6,30,473	2668	770	1,98,169	2525	677	1,77,9721	2629	303	6,97,701	2378
27. Other rectifying, grinding, honing and polishing machines	100	911,588	5732	445	1,79,974	4039	515	2,00,075	4074	512	2,00,159	4068	724	6,1,142	1956
28. Planing	56	20,758	3700	87	1,04,804	1195	80	6,1,19	3036	87	1,04,809	3687	84	1,1,114	3889
29. Planing	50	5,02,564	5100	120	5,1,124	4208	162	6,1,154	3681	115	4,93,500	4180	85	2,4,101	4382
30. Teeth Cutting (Type 3 tons)	-	-	-	11	5,92,11	5385	1	1,00,89	10089	5	1,00,89	6076	5	1,00,89	6076
31. Teeth Cutting (Type 3.5 tons)	23	6,955	3023	77	2,07,041	4821	83	1,50,818	4606	53	2,07,072	3971	74	1,7,112	3077
32. Teeth Cutting (Type 3.5 tons)	77	2,07,041	3023	87	2,07,041	3023	147	6,1,197	4272	84	5,7,110	3945	72	1,7,112	3077
33. Other Teeth Cutting	55	2,11,56	4027	75	1,00,115	2678	173	7,88,848	4522	85	3,7,082	3974	63	3,7,082	3974
34. Planing and Shaping (Type 1.5 tons)	5	8,337	1667	26	7,134	2743	30	8,33,00	2777	24	5,7,110	2944	7	2,2,101	3145
35. Planing and Shaping (Type 1.5 tons)	17	8,337	1667	14	2,061	1567	28	9,2,000	3269	12	6,785	5315	42	7,1,113	1880
36. Other Planing	43	1,02,24	1135	131	4,7,385	3606	145	4,00,001	2721	180	4,49,779	2499	827	1,1,009	373
37. Total Planing Machines	165	2,04,433	1480	182	24,478	1851	513	1,00,079	1975	272	4,00,001	1744	843	1,1,113	1783
38. Special Machines	64	1,68,93	2637	284	7,1,150	2481	612	11,18,09	1803	37	14,091	4065	75	1,1,113	1885
Total	4801	11,1,024	2415	7094	2,07,041	2711	12,477	3,07,192	2500	8310	2,07,041	2711	7094	2,07,041	2500

Imports into Australia, 1970-1 to 1984-85
(Value in '000 US Dollars)

Item	1970-71			1971-72			1972-73			1973-74			1974-75		
	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value
1. Reaming	-	398129	-	-	217819	-	128	321282	2510	170	406925	2405	207	911906	4406
2. Reaming - Vertical	-	-	-	-	-	-	18	5041	553	56	62274	1112	48	3743	76
3. Reaming - Horizontal	-	-	-	-	-	-	24	50003	2067	54	182808	3385	75	294296	4051
4. Combined Machines	-	-	-	-	-	-	57	155351	2725	24	97583	4066	27	128140	4765
5. Drilling and Boring	-	318345	-	-	248901	-	3048	146817	49	805	194526	229	1865	436651	267
6. Grinding	-	551821	-	-	454405	-	-	572500	-	17287	758849	44	25218	1156879	50
7. Surface Grinding	-	-	-	-	-	-	927	114191	123	317	194298	615	272	274523	1008
8. Other Grinding, Polishing, Honing, Lapping	-	-	-	-	-	-	-	-	-	1278	203314	159	1864	4198	3
9. Lathes	1684	1081075	634	775	635284	848	1299	1013009	780	1453	1284332	891	2019	2511684	1145
10. Automatic Lathes	245	311174	1281	110	205010	1864	-	-	-	-	-	-	-	-	-
11. Single Mandrel-head Automatic Lathes	-	-	-	-	-	-	72	134623	1870	95	136843	1436	196	450752	2176
12. Other Mandrel-head Automatic Lathes	-	-	-	-	-	-	16	58382	3650	29	103020	3552	78	366106	4694
13. Turret Lathes	-	-	-	-	-	-	61	95685	1572	78	160089	1924	133	247703	1862
14. Milling - Standard and Special	-	671459	-	-	456217	-	683	674394	967	1159	768573	663	1285	1601563	1248
15. Filing, Shaping, Planing and Trimming	-	153199	-	-	83285	-	157	205422	1508	153	171109	1118	812	593750	1657
16. Presses	-	261617	-	-	698862	-	130	455216	3502	179	169804	949	140	276786	1977
17. Presses - Mechanical	-	-	-	-	-	-	90	321156	3568	135	71545	530	99	188344	1902
18. Shears and Punching Machines	-	90999	-	-	209060	-	520	240602	462	525	228363	435	498	455643	911
19. Shearing for Guillotine - Hydraulic	-	-	-	-	-	-	4	32946	8257	16	48301	3019	16	69348	4334
20. Shearing for Guillotine - Mechanical	-	-	-	-	-	-	50	5057	101	37	10104	273	40	47792	1196
21. Other Machine Tools for Working Metals	-	-	-	-	-	-	1366	410128	322	1196	971678	813	1536	977004	606
Total	-	327408	-	-	323741	-	1899	406635	23045	23045	621836	23045	35546	103186	23045

Appendix 5 (cont'd)

Imports into Brazil, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value
1. Lathes	4068	12887	3	2912	8644	3	2562	6483	3	1116	3321	3	507	1823	4	-	-	-
2. Milling	2867	8383	3	2263	7508	3	2045	5714	3	1195	3467	3	914	2774	3	-	-	-
3. Drilling	3258	8116	2	2697	6074	2	1959	4939	3	1027	2071	2	587	1473	3	-	-	-
4. Gear Cutting	480	795	2	592	656	2	1124	1811	1	827	1763	2	157	415	3	-	-	-
5. Filing, Planing	529	962	2	758	1458	2	782	1086	1	367	660	2	196	647	3	-	-	-
6. Thread Cutting	251	874	3	182	498	3	165	562	3	53	237	4	107	360	3	-	-	-
7. Sawing	159	590	2	175	471	3	98	295	3	93	223	2	37	81	2	-	-	-
8. Grinding	2381	7048	3	2042	6069	3	1872	5214	3	1068	3288	3	522	1788	3	-	-	-
9. Presses and Stamping	-	-	-	3711	4003	1	3289	3855	1	2885	3259	1	356	761	2	-	-	-
10. Other Machine Tools	13392	22423	2	2565	6396	2	2425	6413	3	400	1579	3	139	398	3	-	-	-
Total	27385	63078	2	16722	41579	2	16121	56172	2	8631	19696	2	3522	10506	3	-	-	-

Imports into Chile, 1960-65
(Value in '000 US Dollars)

1. Machine Tools for Metalworking

604 1534 2 660 1734 2 306 1157 4

534

1. Machine Tools for Metalworking

Imports into Colombia, 1960-65
(Value in '000 US Dollars)

2609 5735 1 2477 4422 2

Imports into El Salvador, 1960-65
(Value in '000 US Dollars)

44 108 2 47 147 3

1. Machine Tools for Metalworking

11179

Imports into Peru, 1960-65
(Value in '000 US Dollars)

3334394 - 2261156

1. Machine Tools for Metalworking

11179

Appendix 5 (cont'd)

Imports into Uruguay, 1960-65
(Value in '000 US Dollars)

Item	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Machine Tools for Metalworking	-	255	-	5698	941	-	8920	1397	-	5449	820	-	4094	411	-	-	454	-

Imports into India, 1960-65
(Value in '000 US Dollars)

	1960-61			1961-62			1962-63			1963-64			1964-65		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Machine Tools for Metalworking	-	27592	-	-	29366	-	-	36926	-	-	59559	-	-	52429	-

Imports into Malaysia, 1961-65
(Value in '000 US Dollars)

	1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Machine Tools for Metalworking	-	980	-	-	980	-	-	1121	-	-	896	-	-	627	-

Imports into Thailand, 1960-65
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965		
	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value	Number	Value	Average Value
1. Machine Tools for Metalworking	-	-	-	2984	612	-	5957	1046	-	5233	1508	-	8210	2252	-	9955	1873	-

Imports into South Vietnam, 1960-65
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Machine Tools for Metalworking	-	-	-	481	1141	2	500	868	2	368	667	2	588	1003	3	69	73	1

Imports into Sweden, 1961-65
(Value in '000 US Dollars)

Item	1961			1962			1963			1964			1965		
	Height	Value	Average Value	Weight	Value	Average Value	Height	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Automatic Lathes	1176	5642	3	994	5501	4	1108	3797	3	1173	3783	3	676	2069	4
2. Other Lathes	2781	4500	2	3019	5658	2	1847	4295	2	1520	3511	2	1145	2442	2
3. Planing	235	263	1	390	451	1	187	268	1	142	213	2	95	187	2
4. Drilling	1288	2702	2	1558	3466	2	1055	2677	3	1865	4363	2	937	2327	2
5. Milling	1232	3054	2	1757	4474	3	1320	3648	3	983	2770	3	695	2198	3
6. Grinding	1200	3226	3	1507	3912	3	1234	3600	3	1405	4015	3	588	1951	3
7. Broaching	105	324	3	37	129	3	45	126	3	48	158	3	13	50	2
8. Gear Cutting	48	107	2	59	160	3	114	345	3	301	1009	3	147	567	4
9. Machine for Cutting Strips	654	813	1	720	1078	1	753	1246	2	715	1179	2	383	566	1
10. Punching	26	71	3	55	219	4	186	473	3	93	354	4	92	288	3
11. Presses	1277	1819	1	2979	4053	1	4180	6164	1	2140	5334	2	2699	5454	1
12. Cutting	97	283	3	92	176	2	105	297	3	128	433	3	142	546	4
Total	10357	22891	2	13913	29054	2	12807	28554	2	11491	27680	2	8105	18780	2

Imports into Switzerland, 1961-65
(Value in '000 US Dollars)

Item	1961			1962			1963			1964			1965 (3 Months)		
	Height	Value	Average Value	Weight	Value	Average Value	Height	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
1. Machine Tools for Working Metals	12145	23181	2	16808	37518	2	-	-	-	17822	48207	2	13018	33249	2
2. Lathes	-	4241	-	-	4457	-	-	7937	-	-	8519	-	12956	-	3662
3. Milling	-	634	-	-	1047	-	-	1568	-	-	1949	-	5745	-	1925
4. Drilling	-	2693	-	-	2735	-	-	5285	-	-	4195	-	6035	-	1718
5. Grinding	-	2611	-	-	2457	-	-	3323	-	-	3007	-	6765	-	1657
6. Presses	-	5066	-	-	5211	-	-	6498	-	-	7514	-	9775	-	2392
7. Other Machines for Metalcutting	-	4089	-	-	4390	-	-	6023	-	-	7018	-	7004	-	2428
Total	-	8979	-	-	9067	-	-	14220	-	-	15823	-	5581	-	1850
		22673			29054			42856			49623		55689		16230

Imports into Mexico, 1961-64
(Value in '000 US Dollars)

	1961			1962			1963			1964		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
3998	4149	1		7882	9972	1	10242	15740	1	16156	52330	2

1. Machine Tools for Working Metals

Imports into Argentina, 1960-65
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
34995	16408	-		26922	50085	1	20913	27107	1	11781	18904	1	4584	8707	2	-	-	-

1. Machine Tools for Working Metals

Imports into Bolivia, 1960-65
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
-	-	-		-	18	37	2	19	46	2	79	159	2	87	178	2	83	123

1. Machine Tools for Working Metals

Imports into Venezuela, 1960-64
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965 (January-May)		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
634	1171	1		866	2159	2	2470	2840	1	931	1769	2	980	1405	1	-	-	-

1. Machine Tools for Metal Working

Imports into Ghana, 1960-65
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965 (January-May)		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
3259	390	-		3539	494	-	2783	517	-	16201	591	-	10199	586	-	8752	111	-

1. Machine Tools for Metal Working

Imports into South Africa, 1960-64
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value	Weight	Value	Average Value
-	2022	-		-	3085	-	-	4125	-	-	5833	-	-	6862	-	-	-	-
-	5243	-		-	6401	-	-	7632	-	-	13570	-	-	16184	-	-	-	-
Total	7265	-		9486	-		11755	-		18603	-		22993	-		-	-	-

1. Lathes

2. Other Machine Tools

Total

Imports into Sudan, 1963-65
(Value in '000 US Dollars)

Item	1963			1964			1965 (1 Semester)		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value

1. Machine Tools for Working Metals

1119 835 -

Imports into Tunisia, 1961-64
(Value in '000 US Dollars)

Item	1962			1963			1964		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value

1. Machine Tools for Working Metals

403 763 2

Imports into U.A.R. - 1960-61
(Value in '000 US Dollars)

Item	1961			1962			1963		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value

1. Machine Tools for Working Metals

2625 2 -

Imports into Jordan, 1960-63
(Value in '000 US Dollars)

Item	1961			1962			1963		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value

1. Machine Tools for Working Metals

528 6610212 12319

Imports into Iraq, 1961-64
(Value in '000 US Dollars)

Item	1962			1963			1964 (1 Semester)		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value

1. Machine Tools for Working Metals

227 42692 1860

Weight	227	Value	18092	Average value	1503
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Weight	705	Value	1600	Average value	2
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Weight	2273	Value	1	Average value	-
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Weight	101	Value	2269	Average value	2123
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Weight	202	Value	1852	Average value	1584
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Item	1960-61 (March-February)			1961-62 (March-February)			1962-63 (March-February)			1963-64 (March-February)			1964-65 (March-February)			1965 (March-February)		
	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average	Weight	Value	Average
1. Hydraulic Presses	62	95	2	39	57	1	97	192	2	35	48	2	140	184	1	-	1	-
2. Other Presses	470	1060	2	255	440	2	81	140	2	181	332	2	270	597	2	90	154	1
3. Pneumatic Machine Tools	1589	1622	1	232	620	3	178	333	2	30	99	3	60	268	3	8	24	2
4. Lathes							114	232	2	467	622	1	1139	1570	1	296	367	1
Total	2111	2777	1	526	1117	2	470	905	2	706	1101	1	1609	2359	1	394	646	1

Imports into Lebanon, 1960-65
(Value in '000 US Dollars)

	1960			1961			1962			1963			1964			1965		
	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value	Weight	Value	Average value
1. Machine Tools for Working Metals	-	-	-	361	578	1	468	460	1	394	367	1	-	-	-	-	-	-

Imports into Ceylon, 1960-64
(Value in '000 US Dollars)

Imports into Philippines, 1960-63
(Value in '000 US Dollars)

[illegible]

Import Restrictions on Machine Tools in Selected Countries

<u>Country</u>	<u>Trade Group</u>	<u>Tariff and Preference</u>	<u>Restrictions</u>	<u>Non-tariff Barrier</u>	<u>Economic Condition</u>
Argentina	LAFTA, applying to GATT	- Duty ranges from 50% - 90% according to type on ad valorem CIF value - No effect of Kennedy Round - LAFTA members get preferential treatment	- No import licencing - Severe import restrictions on automotive products	<u>Sales Tax</u> - 10% of duty paid value <u>Statistical Tax</u> - 1½% of CIF value <u>Tax on Ocean Freight Charges</u> - 4% <u>Steel Fund Tax</u> - 20 cvt to 2 pesos/kg <u>Consular Fee</u> - 1½% of total value	- Economic crisis led to a series of devaluations - Large foreign debt
Australia	BPR GATT	- Duty ranges from 7½ - 40% - Due to K.R. duty on two classes were made "free" - Preferential rate BPR - 25% MFN - 35% (GATT)	- Quantitative Restrictions - Exchange control by Reserve Bank - Import licence on limited items	<u>Primage Tax</u> - 5-10% <u>Sales Tax</u> - 12½% (essential products exempted) <u>Harbour Charge</u> , <u>Wharfage Charge</u> , <u>Handling Charge</u> - Rates not known	- Manufacturing industry expanding - Preference for joint ventures

Footnote on Abbreviations used in the Table:

K.R.	= Kennedy Round	GATT	= General Agreement on Tariffs and Trade
EEC	= European Economic Community	LAFTA	= Latin American Free Trade Area
EFTA	= European Free Trade Area	MFN	= Most Favoured Nation
		COMECON	= The Council for Mutual Economic Assistance (also called CMEA)

Country	Trade Group	Tariff and Preference	Restrictions	Exchange Conditions	
Austria	EEFTA	- Duty ranges from 10% - 25% ad valorem - GATT members get preferential treatment	- Imports of metal working tools are liberalised	- Normal business transaction free - No quantitative restriction - Licence for import required but readily granted	- Imports almost entirely owned by private domestic industries - Inflation a continuing problem - Heavy dependence on exports
Belgium	EEC GATT BLEU	- Before K.R. 3 - 11% on CIF ad valorem - After K.R. - 2.5% - 8% on CIF ad valorem - GATT members receive MFN treatment	- Normal business transaction free - No quantitative restriction - Licence for import required but readily granted	- Special Export Tax - 3 - 8% - Transshipment Tax - 7 - 13% on duty paid CIF	- Inflation a continuing problem - Heavy dependence on exports
Brazil	LAFTA GATT	- Duty ranges from 15 - 50% on CIF ad valorem - No effect of K.R. - Preferential rates to LAFTA and GATT	- Exchange transactions must be made through authorised commercial bank - Differential exchange rates - Import licence required	- Customs Subsidies - 5% on CIF ad valorem - Merchant Marine Importation Tax - 5% of net ocean freight - Port Improvement Tax - 1% of CIF - Consumption Tax - Based on Cruzeiro value, incl cost of foreign exchange. Ranges from 2 - 40%	- Inflation - attempts being made to bring it under control

<u>Country</u>	<u>Trade Group</u>	<u>Tariff and Preferences</u>	<u>Restrictions</u>	<u>Non-tariff Barrier</u>	<u>Economic Condition</u>
Canada	GATT BPR	<u>Rates</u> Before After K.R. K.R. Product 1) available in 22.5% 15% Canada 11) not available 7.5% Free in Canada - Preferential rates to GATT and Commonwealth members	- Only few item are sub- jected to import licensing - no licen- cing of machine tool imports	<u>Customs Surcharges</u> only	- Industrial activity accelerat- ing
Chile	LAFTA GATT	- Duty ranges from 55 - 145% of CIF ad valorem - No effect of K.R.	- Highly protective - imports only on priority basis - Approval of remittance by Central Bank - Differential exchange rates - Prior deposits - Disclosure of commis- sion data required	<u>Surcharge</u> upto 300% of CIF value <u>Sales Tax</u> - 6% of selling price	- Essentially a wealthy country - Plenty of mineral deposits - Governmental parti- cipation in econo- mic activities - Serious shortage of foreign exchange
Denmark	EFTA GATT OECD Seeks EEC membership	- 10% before K.R. - reduced to 6% after K.R. - GATT members given MFN treatment - No duty for EFTA countries	- Goods not on restricted list may be imported without licence from 'free list' area. Almost all countries outside Soviet block belong to this area - Currency freely conver- tible to US Dollar.	<u>Turnover Tax</u> - 12½% on CIF duty paid value	- Economic base changing from agriculture to industry

Economic Condition

<u>Country</u>	<u>Trade Group</u>	<u>Tariff and Preferences</u>	<u>Restrictions</u>	<u>Non-tariff Barrier</u>
France	EEC	- Before K.R. - 3 - 11% on ad valorem CIF value	- Practically no quantitative restriction on industrial goods	Turnover Tax - 2% on value plus duty
	GATT	- After K.R. - 2.5 - 8% on ad valorem CIF value	- Currency on the whole freely convertible	Import Equalization Tax - 19.8%
	OECD		- Credit to importers generally available	Customs Stamp Tax - 2% of Customs value
				Customs Broker Fee - Std schedule based on CIF value duty paid
				Value Added Tax - 20% on CIF duty paid value
				Sales Tax - 25% on CIF duty paid value
				Handling Tax - Rates Port Tax)not)known
Germany	EEC	- Before K.R. - 3-11% on CIF ad valorem	- No restriction on foreign exchange dealings.	Turnover Equalization Tax - Ranging from 1.5% - 8% on CIF duty paid value
	GATT	- After K.R. - 2.5-8% on CIF ad valorem	- Trade is free of restrictions	
	OECD	- GATT members receive MFN treatment		- Rate of economic growth is lower than expected

Country	Trade Group	Tariff and Preferences	Restrictions	Non-tariff Barrier	Economic Condition
Italy	EEC GATT	- Before K.R. - 5 - 11% on CIF ad valorem - After K.R. - 2.5 - 8% on CIF ad valorem - GATT members receive MFN treatment	- Practically 80% of all items can be imported without quantitative restrictions - Foreign exchange position not very difficult	<u>Sales Turnover Tax</u> - 4% on CIF duty paid value <u>Equalization Tax</u> - 0.36 - 7.6% <u>Statistical Fee Tax</u> - 0.02 per quantum of gross weight <u>Administrative Fee</u> - 0.5% on CIF value <u>Local Tax, Transmision Tax, Unified Tax, Storage Charges, Port Charges, Unloading Charges</u> - Rates not known	- Economic conditions improving rapidly - Imports rising faster than export
Japan	GATT	- Before K.R. 15 - 20% of ad valorem CIF value - After K.R. - 7.5 - 15% of ad valorem CIF value - No preferential treatment accorded to any country	- Import licence required - Few quantitative restrictions	<u>Import Deposit</u> - 15 to 5% of CIF value, refundable after 80 days <u>Commodity Tax</u> - 5 to 40%	
Mexico	LAFTA	- "Specific" duty of 8 cents gross per kg. - Ad valorem duty of 24% levied on invoice value or Mexico official value, whichever is higher - LAFTA members receive special tariff concession	- No exchange control and currency is freely convertible - Imports controlled; prior import licence required for many machine tools	<u>Surtax</u> - 30% of duty <u>Consular Fee, Mercantile Tax, Municipal Tax, Sales Tax</u> - Rates not known	- Great emphasis on industrialisation

Country	Trade Group	Tariff and Preference	Restrictions	Non-tariff Barrier	Monetary Condition
Netherlands	EEC	- Before K.R. - 3 - 11% on ad valorem	- Practically no exchange control	Turnover tax - Generally 5% assessed on CIF duty paid value	- Inflation
	OECD	- After K.R. - 2.5 - 8% on CIF ad valorem	- Liberal trade policy		- Scarce capital
		- GATT members receive MFN treatment			
Spain	OECD	- Duty ranges from 1.0 - 24% depending on type and weight for metal-cutting machines	- Imports are subjected to exchange control	Surtax - 1% of custom duty	- Rapidly developing economy
	GATT	- Duty ranges from 1.0 - 14% depending on type and weight for metal-forming machines	- Increasingly liberal trade policy	Fiscal Tax - 5.16% on duty paid value	
		- No effect of K.R.	- "Buy Spanish" law for public agencies	Miscellaneous Tax, Sales Tax - Rates not known	
Sweden	OECD	Machine tools weighing up to 10 metric tons	- Commercial transactions are not subjected to any restrictions	Sales Tax - 6% calculated on final price	- Economy based on free enterprise
	EFTA	- Before K.R. - 10% of the CIF ad valorem		Turnover Tax - 11.11% assessed on CIF duty paid value	- Fiscal policy directed towards achieving full employment, restraining inflation, creating favourable balance of payment and moderating business cycles
	GATT	- After K.R. - 6% of the CIF ad valorem	- Swedish Krone freely convertible to other currency		
		Machine tools weighing more than 10 metric tons			
		- Duty free both before and after K.R.			
		- OECD, EFTA and GATT members receive either preferential or MFN treatment			

Appendix 6 (cont'd)

<u>Country</u>	<u>Trade Group</u>	<u>Tariff and Preference</u>	<u>Restrictions</u>	<u>Non-tariff Barrier</u>	<u>Economic Condition</u>
Switzerland	EFTA GATT OECD	- Before K.R. duty ranged from 2% to 50% depending on weight of machine tools - After K.R. duty ranges from 1 to 25% depending on weight. - EFTA members allowed duty-free entry - GATT members receive MFN treatment	- Completely free financial market - No import licence needed	Sales Tax - 2.7 to 5.4% on CIF price plus custom duty and other fiscal charges Statistical Tax - 5% of total Swiss customs charges Turnover Tax - 3.6 to 5.4% of CIF duty paid value	- Free economy
Turkey	EEC GATT	- Ad valorem rate of 25% - No effect of K.R.	- Licence and exchange control; very restrictive - Rigid control through combination and licensing system - New list of import regulations issued by Ministry of Commerce every 6 months	Customs Sur-tax - 15% on duty paid Customs Clearance Expenses, Port and Wharfage Tax - 5% on CIF value, customs sur-tax and customs clearance expenses Stamp Tax - 10% of CIF value Production Tax - 10% of landed goods' value	
U.K.	GATT OECD EFTA Seeks EEC membership	- For Flying shears of a kind in Rolling Mill - Before K.R. 25% and after K.R. 12.5%	- Most imports allowed unrestricted only under open general licence - Only few items subjected to quota restrictions.	Purchase Tax - 10% - 25%	- Currency devalued recently

<u>Country</u>	<u>Trade Group</u>	<u>Tariff and Preference</u>	<u>Restrictions</u>	<u>Non-tariff Barrier</u>	<u>Economic Condition</u>
U.K. (cont'd)		<u>For Other Machine Tools</u> - Before K.R. 10% and after K.R. 9% GATT, OECD and EFTA members are accorded MFN and/or Preferential treatment			
U.S.A.	GATT	- Ad valorem rates ranging from 12 to 20% - 50% tariff concession being implemented after K.R. - No preferences to any suppliers or machine tools not produced in the U.S.	- No licencing or quotas - "Buy American" policies for Government purchases and contracts, also applicable to firms working on Government contracts	None	- Although trade policies are very liberal, industry is pressurising Government to curb imports to check deficit balance of payments - No preferences for developing countries - Tariffs are expected to rise
U.S.S.R.	COMECON	- Ad valorem rates 5 - 20% - MFN rates 0 - 10% - MFN treatment to those who reciprocate it	- Complete Government control - Exclusively state trading	Not available	- Highly industrialised country
Yugoslavia	GATT	- Average 11% ad valorem, computed on CIF value - GATT members receive MFN treatment	- Strict control on foreign exchange	<u>Customs Sur-tax - 3% on CIF duty paid value</u> All non-tariff barriers scheduled to be removed by 1970	

Appendix - 7

EXPORT INCENTIVES AND PROMOTION IN SELECTED FOREIGN COUNTRIES

Country	: <u>BELGIUM</u>
Cash Subsidy	: Nil
Tax Rebate	: Rebate of turnover tax paid at any stage on all materials used in producing exported goods (inputs, packing material, machinery) and on the final goods exported. Rebate on all taxes on transportation, storage, etc involved in export.
Concessional Input Prices:	Nil
Import Privileges	: Tax exemption on imported materials used in production of export goods. No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.
Export Credit	: Short, medium and long-term export credits offered by Government agencies, and rediscount of credit provided by financial institutions. Export credit is not given at a preferential low interest rate.
Export Credit Insurance	: Government insurance of export credits against commercial and political risk, reinsurance of up to 30% of commercial risks insured by private companies.
Export Councils	: Belgium Office of Foreign Trade (OBCE) is a parastatal organization.
Market Research	: Market research is conducted by the OBCE.

- Sales Promotion : The OBCE arranges official Belgium participation in overseas trade shows and cooperates with industry to arrange their participation.
- It also arranges trade missions by Belgium businessmen and government officials.
- It also provides information for dissemination abroad on Belgium industry and products, contacts potential foreign buyers on behalf of Belgium businessmen.
- Market Development : The OBCE also grants financial aid to individual firms or industry associations to send delegates abroad to prospect foreign markets or to establish permanent representation in foreign countries. The firms repay the money only if the results of the survey are satisfactory.
- Country : ITALY
- Cash Subsidy : Nil
- Tax Rebate : Rebate of turnover tax on exports.
- Rebate of import tax on iron and steel components of exports.
- Concessional Input Prices: Nil
- Import Privileges : No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.

- Export Credit : A government agency provides medium term credit, and discounting of, up to 85% of export credit extended by other institutions.. A special low interest rate is charged on such refinancing (3%), and the agency may grant financing institutions an interest subsidy to make up the difference between the cost of borrowing on the market and the special interest rate of 5.5% charged to the exporter. The maximum allowable rate of interest on export credit is 8.5%.
- Export Credit Insurance : The government insures medium term and reinsures short term export credit against political and catastrophic risks, nonpayment when the export has been guaranteed by a foreign state or public agency, insolvency of the buyer, and risks of rising production costs.
- Export Councils : The Italian Institute for Foreign Trade is a government organization.
- Market Research : The IIFT provides information on foreign markets, foreign customs duties, foreign trade regulations and currency controls, foreign trade statistics, and individual foreign firms. The IIFT reports on foreign procurement projects.
- Sales Promotion : The IIFT coordinates government participation in international trade fairs, special Italian trade exhibits, and Italian trade centers in London and Stockholm. It organizes trade missions abroad and missions of foreign businessmen to Italian industrial plants.
- Market Development : Nil

- Other Comments : Foreign trade courses for university graduates and scholarships to foreign trade specialists for commercial practice in foreign markets of special interest to Italy are government subsidized.
- Country : NETHERLANDS
- Cash Subsidy : Nil
- Tax Rebate : The turnover tax applied at each stage is rebated to the exporter.
- Rebate of taxes paid on solid fuels, electricity, and gas consumed in the manufacture of exports.
- Concessional Input Prices: Nil
- Import Privileges : Refund of taxes and tariffs on imported inputs for exports.
- Bonded warehouses for inputs for exports allow manufacturer to avoid paying taxes and tariff on imported inputs for exports.
- No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.
- Export Credit : Quasi-government organization gives export credit. There is no preferential rate favouring export financing over domestic sales financing.
- Export Credit Insurance : Government fully reinsures export credit guarantees by a private firm, covers 75-90% of the credit, for political and non-commercial risks including insolvency, protracted default, buyer's failure to accept goods, exchange transfer, war, revolution, and other non-commercial risks beyond control of exporter or buyers.

Export Councils : The Netherlands Council for Trade Promotion is financed equally by Government and industry. It has control over government subsidies for trade promotion.

Market Research : Market research is done by the Economic Information Service in the Ministry of Economic Affairs, with assistance from the Dutch Foreign Service. The NCTP analyses markets on the basis of missions abroad and government sources.

Sales Promotion : The NCTP assists government in providing Dutch representation at Foreign trade fairs and exhibitions. Participation in trade fairs is subsidized by the Dutch government.

There is a mobile trade fair.

The government sponsors industrial trade missions organized by the NCTP.

Market Development : Nil.

Country : FRANCE

Cash Subsidy : Nil

Tax Rebate : Exclusion of exports from value added sales tax and the services tax. Exporter gets a credit with the tax authority for the value added tax on inputs plus tax on services making up the export product, and a credit based on capital goods or overhead expenses related to export.

Market studies for the establishment of an office abroad are tax deductible, as are the expenses incurred during the first three years of operation of such office. Restitution (which may be waived) is spread over the subsequent five years.

Income placed in a reserve fund to cover risks incurred through export sales and work performed abroad with medium term credits may be excluded from taxable income, but reserves not used to cover such losses must be taken back into taxable income in the next year.

Holders of an Exporter's Card (producers exporting at least 20% and merchants exporting at least 50% of their total sales volume) may be allowed to delay payment of taxes beyond the due date, if they can show that their temporary inability to pay is due to their efforts to export.

Concessional Input Prices: Nil

Import Privileges : Goods imported to be re-exported as components of a product are exempted from import tariff and taxes.

No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.

Export Credit : The central bank gives an $\frac{1}{2}\%$ reduction on the rediscount rate to exporters, and credit is available not only for export shipments but services such as marketing.

On sales of heavy equipment to developing countries, for a loan over 8 years and a minimum amount of \$ 5 million, the French banking system will loan money directly to the foreign buyer, private or government, so as to enable him to pay his French supplier on a cash-on-delivery basis. The portion of the loan in excess of 5 years may be drawn from government funds.

The government has indicated it will guarantee loans floated by a group of French banks, insurance companies, and trade associations to facilitate creation of overseas marketing networks for French products.

Export Credit Insurance : A quasi-governmental organization insures against commercial, exchange, price increase, catastrophic and political risks. Policies generally cover 70-90% of risk, cover risks occurring in France on exports, as well as abroad, and can be applied to all transactions or individual transactions.

For capital goods manufactured on the basis of a specific bid and requiring a long lead time, exporters may take insurance against an increase in costs of production as a result of changed economic conditions in France.

Export Councils : Nil

Market Research : French Commercial Counselors are brought back from abroad to conduct conferences with businessmen on export opportunities.

Sales Promotion : The government, in coordination with industry, participates in international trade fairs and solo French exhibits. Government subsidizes space rentals. French trade centers have been established in Tokyo and Stockholm. The government sponsors trade missions by businessmen to developing countries, and sponsors business groups to accompany French exhibitions.

The government offers insurance against risks involved in efforts to sell abroad through participation in foreign trade fairs. An insured firm receives an advance of 50% of authorized expenses (60% for holders of Exporter's Cards). If the firm's efforts are successful, it reimburses the advance in instalments, as a percentage of sales in the area where the trade fair took place, over a period of a year or two.

Market Development

- : Market studies for the establishment of an office abroad are tax deductible, as are the expenses incurred during the first three years of operation of such office. Restitution (which may be waived) is spread over the subsequent 5 years.

Government provides insurance against financial risks arising from export promotion projects in foreign markets. If exploratory programs fail wholly or in part, firms can recover up to 50%, and sometimes more, of the amount disbursed and not amortized.

Country

- : JAPAN

Cash Subsidy

Nil

Tax Rebate

- : Firms engaged in export are given additional depreciation allowances on the basis of the ratio of specified overseas transactions to total revenue.

Customs tariffs on inputs for exports may be rebated upon Cabinet order.

As of 1962, exporters were given refund of tariffs and excise tax on raw materials and components used in exports.

Until 1964 trading companies were allowed to deduct from their taxable income 1% of the value of their exports and manufacturing companies were allowed to deduct 3% of the value of their sales of exported goods to the trading company.

See "Market Development".

Concessional Input Prices: Nil

Import Privileges

- : Bonded warehouses where imports may be stored on a duty free basis.

Prior to 1962 exporters were allowed to retain 5% of the value of exports to use to import goods which could be freely sold at a profit.

Export Credit

- : Exchange bonds provide short term export finance before and after shipment. The government Export-Import Bank offers medium and long-term export credit, finances upto 70% of the value of the contract minus down payment and profits if credit is between 6 and 12 months, and 80% if over 12 months. The discount rate for exports of capital goods is at a special rate $1\frac{1}{2}\%$ below the rate on other manufactured goods. In 1962 it was reported that the interest rate for export credit was 3% lower than for other purposes.

Export Credit Insurance

- : The government insures export credit against commercial, catastrophical, and political risks occurring outside Japan. Policies cover either an association's or firm's shipments or specific transactions, and cover risks of insolvency, protracted default, war, revolution, civil war, exchange transfer delay, new import-export restrictions, and any cause of loss beyond control of exporter or importer occurring outside Japan. Goods sent on consignment can also be insured.

Export Councils

- : The Japan External Trade Organization (JETRO), largely financed by the government and operated under the supervision of the Ministry of Trade and Industry is the major trade promotion body. In 1958 the government gave it a capital of ¥ 2,000 million, and it receives an yearly subsidy, which was ¥ 1,500 million in 1961-62. It has 15 Japan Trade Centers in

in New York, San Francisco, Los Angeles, Toronto, Hamburg, Sydney, Cairo, and Bangkok, Trade Offices in Chicago, Hong Kong, and Singapur, and Machinery Centres in Bombay and Mexico, and at least 40 research offices around the world.

Market Research

- : JETRO conducts market research abroad. In addition, market research on behalf of a particular firm is done by JETRO with the expense shared equally by JETRO and the firm.

Sales Promotion

- : JETRO provides information services on Japanese products in foreign countries and makes films and publishes periodicals to publicize Japanese products. JETRO and the exporter share equally the costs of such films. JETRO pays for distribution of catalogues and literature.

JETRO operates Japan Trade Centers and two Japan Machinery Centers abroad. Their showrooms are available for use by firms handling Japanese products. The Japan Trade Center in Toronto is in an attractive building in a prime location and has facilities to display a limited number of items (e.g. four automobiles), has a display of literature on Japanese industry and manufacturers' sales brochures, and has a number of employees to answer questions.

A specially-designed 13,000 ton 'floating fair' ship housing exhibits travels around the world to target trade areas.

A mobile trade caravan of specially-designed vehicles is carrying Japanese product exhibits through Africa.

JETRO also coordinates and subsidizes exhibitions at international trade fairs, and the Japan Trade Centers participate in such shows.

The Japan Consulting Institute provides free consultant engineering services in connection with the sale of heavy industrial plants and equipment. It has 12 overseas offices in developing countries.

Export Inspection is provided to the industry at charges not more than 1% of the F.O.B. value, with inspection done by government or designated agencies.

Market Development

- : The cost of overseas market development may be deducted from the normal tax base, up to 2 $\frac{1}{2}$ % of the proceeds obtained from overseas transactions. One-fifth of this amount is added back to income in each of the five succeeding years.

Exporters can insure their advertising and publicity overseas, with compensation of 50% of the loss suffered if exports are not sufficient to cover the advertising expense.

Other Comments

- : Some of the facilities granted to exporters in the past have now been withdrawn because of the successful establishment of exporting.

Country	: <u>SWITZERLAND</u>
Cash Subsidy	: Nil
Tax Rebate	: The turnover is rebated to the exporter.
Concessional Input Prices	: Nil
Import Privileges	: No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.
Export Credit	: Long-term credit is provided in the form of buyers' credits backed by the buyers' Government in agreement with the Swiss Government.
Export Credit Insurance	: Government guarantees export credit against political and other non-commercial risks, but not catastrophic or commercial risks. Guarantees apply to short and medium term suppliers credits, and long term suppliers credits (granted mainly to match credit terms offered by competitors) and buyers credits granted in bilateral agreements between the swiss Government and developing countries. Guarantees may cover specific transactions or all shipments.
Export Councils	: Nil
Market Research	: Market research is carried on by the Office for Development and Trade, financed half by Government and half by private industry, which publishes reports on markets and foreign trade regulations.
Sales Promotion	: Nil
Market Development	: Nil

Country	: <u>UNITED KINGDOM</u>
Cash Subsidy	: Nil
Tax Rebate	: Rebate of purchase tax on exports. Rebate of taxes and tariffs on imports which constitute either a part of or the total product exported.
Concessional Input Prices	: Nil
Import Privileges	: Bonded warehouses where imported inputs for exports can be stored to avoid paying tariff and purchase tax. No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.
Export Credit	: Central bank refinances insured export credit of 2 years or more, upto a limit of 30% of the loan outstanding, or repayments due in the next 18 months, whichever is greater. Commercial banks may count what is thus refinanceable as liquid when calculating their liquidity ratios. Export credit is financed at a lower, preferential rate. Tied foreign aid.
Export Credit Insurance	: Export credit insurance from the Export Credits Guarantee Department, a government agency, covers commercial risks, such as insolvency of the buyer or his failure to pay or buyer's refusal to accept goods; political risks, such as import licence restrictions, war, revolution; additional handling, transport, or insurance charges arising from interruption or diversions of the voyage; any other cause of loss occurring outside the U.K. and beyond the control of the exporter or buyer. Covers credits upto five years, between 90 and 100% of the losses incurred, and apply to either all shipments of an exporter or to specific shipment.

Export Councils

- : The British National Export Council was formed by Government and industry to bring trade opportunities to the notice of exporters and see new openings for the sale of British goods.

Market Research

- : The British National Export Council will pay one-half the overseas cost of market research sponsored by a trade association or chamber of commerce. Information is published daily on overseas tenders, export opportunities arising from capital projects; market reports estimating the prospects for specific goods in individual countries; other trade leads.

Sales Promotion

- : The Overseas Trade Fairs Directorate, in collaboration with industry, arranges collective participation by firms in trade fairs. The Board of Trade provides free space and stand for each firm taking part in a group display sponsored by a trade association at an overseas trade fair. It assists in translating sales literature and in plane fares for participants. For fairs outside Western Europe, the Board also pays up to one half of the freight charges for returning unsold goods exhibited at fairs. All-British trade fairs are also sponsored by the Government.

At the ASTME machine tool exposition in the U.S. in 1967 and 1968, the British Machine Tools Trades Association, with government sponsorship, had the largest among the foreign national exhibits. In 1968, machines from 24 member firms were exhibited in 10,710 square feet of space rented at a cost of \$ 64,260. The Board of Trade published a 50 page illustrated booklet on British machine tools for distribution at the exposition.

Substantial financial aid is available for trade missions involving groups of foreign businessmen visiting Britain to buy and for trade missions involving British businessmen going abroad to sell. For approved projects, The Government pays upto half the basic costs of travel and accommodation.

The U.K. maintains four trade centres in North America.

Country	: <u>U.S.A.</u>
Cash Subsidy	: Nil
Tax Rebate	: Nil
Concessional Input Prices	: Nil
Import Privileges	: No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.
Export Credit	: Good facilities through Export-Import Bank, which provides export credit, loan guarantees and insurance.
Substantial amount of tied foreign aid.	
Export Credit Insurance	: A comprehensive system of export credit - insurance jointly operated by the Export-Import Bank with the Foreign Credit Insurance Association (an association of private insurance companies).
Export Councils	: The U.S. Government actively assists exporters through Domestic and International Business (DIB) unit of the Department of Commerce. The DIB has two sections: (i) the Bureau of International Commerce (BIC) which has primary responsibility for promoting exports and investment abroad; (ii) the Business and Defense Services Administration (BDSA), one of whose 24 divisions,

the Metalworking Equipment Division promotes the interests of the machine tool industry (see pages A141, A142 of U.S. Report for details).

Market Research

- : The U.S. Government has an impressive system of commercial intelligence to assist U.S. exporters both in terms of information gathering and information dissemination. The Commercial Officers of the U.S. Foreign Service are administered by the BIC, and regularly collect and report trade information, which the BIC and BDSA disseminate among U.S. exporters. Further BIC and BDSA organise foreign market surveys and make available to prospective exporters a wealth of data and information for planning their export efforts (see pages A142 to A146 of U.S. Report for details).

Sales Promotion

- : Beyond providing market information, the U.S. Department of Commerce sponsors and subsidises sales promotion activities for U.S. products in foreign markets. It has permanent showrooms at the U.S. Trade Centres in London, Frankfurt, Stockholm, Milan, Tokyo and Bangkok. Further, U.S. Commercial Exhibitions are staged at major international trade fairs. In addition, it operates Business Information Centres at trade fairs, mobile trade fairs and sample display centres in certain cities.

Market Development

- : Nil

Country

- : WEST GERMANY

Cash subsidy

- : Nil

Tax Rebate

- : Rebate of value added tax on exports

No rebate of tariffs on inputs for exports.

Concessional Input Prices

- : Nil

Import Privileges

- : Free trade zones with tax and tariff free imports of inputs for exports (Hamburg).

Bonded warehouses where inputs for exports can be stored and used without payment of taxes and tariff.

No barriers to import of inputs other than tariffs and taxes applied to indigenous sources as well.

Export Credit

- : Central bank rediscounts paper for credits of 1-4 years to developing countries.

No preferential export rediscount rate.

Tied foreign aid.

Export Credit Insurance

- : Export credit insurance from government agencies, covering risk of insolvency and political risks, up to 90% of the credit risk, but not exchange risks.

Export Councils

- : Nil

Market Research

- : The Federal Office of Foreign Trade Information publishes a weekly magazine with commercial information and country and market profiles, economic studies, legal guides, and guides on selling methods in various countries.

Sales Promotion

- : Government participation at overseas trade fairs in form of information centres, sample displays, and Government-industry exhibits in which the Government rents or builds a pavilion and leases space to German exhibitors, usually at the same rates prevailing at the rest of the fair.

There has been no official German participation in current machine tool exhibitions in the U.S.

Market Development

- : Nil

FOREIGN MARKET SURVEY REPORT

UNITED STATES OF AMERICA

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UNITED STATES OF AMERICA

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1. Demand for Machine Tools in the U.S.

1.1 Size of Sectoral Markets

Table 1 shows the breakdown of machine tools by sector in the U.S. for 1968. It shows stocks of machine tools held rather than current purchases. These statistics emphasize the predominant position of the metalworking industries, which accounted for 83% of metalworking machine tools held.

In the earlier stages of economic development, the chief market for machine tools is in repair and maintenance workshops in the private or public sector. However, in advanced industrial economies, including the U.S., by far the largest market for machine tools is in direct production applications in the metalworking industries, which account for 48% of the shipments, 51% of the value added, 49% of the employment, and 45% of the capital expenditures of all U.S. manufacturing.

The following market survey focuses on the users of machine tools in the metalworking production industries. Nevertheless, there is a very sizeable market for machine tools in repair shops, technical training schools, and other facilities not included in the metalworking industries. Moreover, in the advanced countries many of the smaller, standard machine tools which India produces are most suited to the needs of these non-production sectors.

Table - 1

Sectoral Distribution of the Inventory of Machine Tools in the United States, 1968

	Machine Tools					
	Total		Metalcutting		Metalforming	
	Number ('000)	Percent	Number ('000)	Percent	Number ('000)	Percent
Metalworking industries (SIC 19, 25, 33-39). Includes machine tools in production lines and tool rooms, maintenance shops, and training	2,870	82.7%	2,175	83.0%	695	81.8%
Other industrial use: Toolrooms, maintenance shops and training in non-metalworking plants; also government-owned arsenals and shipyards.	430	12.4%	300	11.5%	130	15.3%
Institutional training and research: Colleges, vocational institutes, and high schools	90	2.6%	85	3.2%	5	0.6%
New and used machines in storage and surplus, including government-owned inactive machines and machines held by builders and distributors.	80	2.3%	60	2.3%	20	2.4%
Total	3,470	100.0%	2,620	100.0%	850	100.0%

Source: Tenth American Machinist Inventory of Metalworking Equipment, 1968.

1.2 The Metalworking Industries

Total U.S. metalworking production amounts to about \$ 250,000 million per year, with value-added approximately half that. The metalworking industries consist of none 2-digit Standard Industrial Code (SIC) classifications. The relative importance of the different industries can be measured in terms of sales, value added, employment, capital expenditures, or number of machine tools held, which are shown in Appendix 1.

These data indicate the major importance of four metalworking industries, namely fabricated metal products, machinery except electrical, electrical machinery and equipment, and transportation equipment. In 1968 these accounted for 81.2% of the machine tools in the metalworking industries, or 67.2% of all machine tools in the U.S. It should be noted that SIC 33, Primary Metals Industries, includes foundries and forge shops which do metalworking but also includes all the primary metal plants, like steel mills, where the machine tools are primarily for maintenance.

1.2.1 Characteristics of Metalworking Firms

Appendix 2 gives a breakdown of the metalworking industries by employment and number and size of plant. Most notable is the fact that there are over 32,000 plants in the metalworking industry with 20 employees or more, and of these over 13,000 have 100 employees or more. In fact, according to the IBM Market Place File and the McGraw-Hill Census of Manufacturing Plants, in 1968 there were 80,000 plants with under 50

employees, another 9,900 plants with 50 to 99 employees, and 15,000 plants with 100 or more employees in metalworking. In addition, there are users outside the metalworking industries.

This suggests the vast magnitude of the task of distribution of machine tools and indicates the importance of securing established distributors with good reputations and clienteles to handle Indian machine tools.

It is particularly important from the point of view of developing an export strategy for the Indian machine tool industry to see the distribution of machine tools by plant size. Table 2 shows that there are almost 650,000 metalcutting machine tools and over 190,000 metalforming machine tools in plants with fewer than 50 employees. These firms, plus non-metalworking industries and training schools, account for 1.36 million machine tools, or 40% of the total in active use. However, in terms of number of customers there are more than ten times as many in this group than in metalworking plants with 50 or more employees, which account for the other 60% of machine tools held.

Appendix 3 gives a geographical breakdown of metalworking production by state. Appendix 4 gives a similar geographical breakdown for the inventory of machine tools by metalworking market area. These tables demonstrate the concentration of the U.S. metalworking industries in the industrial belt of the Northeast and Great Lakes. Thus, in 1967 a contiguous set of eleven of the fifty states had 66% of the U.S.

Table 2

Distribution of Metalworking Plants, Equipment & Machine Tools by Size of Plant in the U.S., 1968

	<u>Under 50</u>	<u>50 - 99</u>	<u>100 Employees</u>
	<u>Employees</u>	<u>Employees</u>	<u>and over</u>
Number of Plants	80,001	9,924	14,954
Number of Employees	820,759 (8%)	670,931 (7%)	8,506,410 (85%)
Number of Metalcutting Machine Tools	646,497 (50%)	278,703 (15%)	1,250,109 (57%)
Number of Metalforming Machine Tools	190,688 (28%)	90,804 (15%)	412,987 (59%)

Source: Tenth American Machinists Inventory of Metalworking Equipment, 1968

metalworking employment in plants employing 20 or more (see Table 3) and in 1968 roughly the same area had 70% of all the machine tools in the metalworking industries (see Table 4). Moreover, just across the Canadian border from the U.S. industrial belt is a similar concentration of metalworking in the Canadian provinces of Ontario and Quebec.

Outside of this area the major U.S. metalworking centre is California, with 10.0% of U.S. metalworking employment and (including Nevada and Arizona) 9.9% of machine tools, with lesser centers in Texas, Missouri, and Washington. The fastest growing metalworking areas are the South and Southwest. The area with by far the most rapid growth is Southern California (Los Angeles), which is a centre for aero-space and other technologically advanced industries. Other growth areas were the Atlanta-New Orleans, Dallas-Houston, and Richmond market areas. Between 1963 and 1968, the share of the Northeast industrial belt in the metalworking equipment inventory fell from 77 to 70%.

The geographical concentration of metalworking suggests the importance of marketing efforts and distribution facilities for Indian machine tools in the Northeast. However, because of the vast size of the U.S. market, the market for machine tools in California alone is comparable in size to that in Canada, and hence the areas outside the industrial belt are very important markets for imported machine tools. Moreover, some suppliers of foreign machine tools have had their best markets in the West, especially around Los Angeles, where growth is more rapid, especially of small subcontracting shops. (Iron age, March 21, 1968, p 75).

Table 3

Metalworking Employment in the U.S. Industrial Belt, 1967

<u>State</u>		<u>State's percentage of all metalworking employment in plants with 20 or more employees</u>
1.	Massachusetts	3.79
2.	Rhode Island	0.66
3.	Connecticut	3.62
4.	New York	8.46
5.	New Jersey	4.27
6.	Pennsylvania	8.66
7.	Ohio	9.77
8.	Michigan	8.86
9.	Indiana	5.16
10.	Illinois	8.97
11.	Wisconsin	<u>3.46</u>
Total of eleven states		<u>65.68%</u>

Source: Appendix 3.

Table 4

Metalworking Machine Tools in the U.S. Industrial Belt, 1908

Market Region	Region's percentage of all machine tools in metal- working plants
1. Massachusetts, Rhode Island, Vermont, New Hampshire & Maine ..	3.2
2. Connecticut ..	4.4
3. Eastern New York, northern New Jersey ..	10.5
4. Western New York ..	3.8
5. Eastern Pennsylvania, southern New Jersey, and Delaware ..	5.5
6. Western Pennsylvania, east-central Ohio, West Virginia ..	3.3
7. North-east Ohio ..	5.1
8. North-west Ohio ..	1.2
9. South Ohio and east Kentucky ..	3.5
10. East Michigan ..	7.3
11. Indiana, except north-west ..	3.0
12. Northern Illinois, north-west Indiana, east Michigan, and Iowa ..	13.2
13. South Wisconsin ..	<u>5.5</u>
Total	<u>70.5</u>

Source: Appendix 4.

1.2.2 Role of Foreign and Government Ownership

Within the U.S., industrial demand for machine tools is dominated by private, indigenously owned and controlled business. Unlike Canada, where a great deal of business is controlled by foreign (especially U.S.) companies, and many of the developing countries, where a great deal of business is controlled by foreign companies or local expatriates, in the U.S. the decision to purchase machine tools is entirely in the hands of local native citizens. Moreover, unlike many areas of the world, direct government purchases are a relatively small percentage of the total. American Machinist reported that in 1968 4% of all machine tools were owned by the U.S. Department of Defense (see Table 5). A large share of these machines are located in privately owned plants, primarily in the aerospace and ordnance industries.

Table 5

Department of Defense Ownership of
Machine Tools, 1968

	Number (:000)	Percent
Department of Defense owned	130	3.7%
Active - Government Plants	45	
Active - Contractors Plants	76	
Inactive	10	
Other	<u>3,340</u>	<u>96.3%</u>
Total	<u>3,470</u>	<u>100.0%</u>

Source: Tenth American Machinist Inventory of Metalworking Equipment, 1968, from Defense Industrial Plant Equipment Center.

However, government military spending does have a large role in the demand for machine tools. The peak levels of U.S. machine tool production have been in wartime; World War II, the Korean War, and the Vietnam War have all given a large boost to machine tool purchases.

In late 1966, 10% of the orders booked for machine tools with U.S. manufacturers were from military contractors and another 30% were from industries where the machine tools would be used for either military or military-related work. At the beginning of 1966, a National Machine Tool Builders' Association report estimated that more than 50% of machine tool output was going to military and military-supported industries. Military spending on metalworking machinery increased by 158% between fiscal 1965 and 1967. Nevertheless, despite the Vietnam War and the space program, in 1968 the ordinance industry had only 1.2% of all machine tools while government-owned arsenals and shipyards had another 1.3%.

1.5 U.S. Demand for Machine Tools in the Next Decade

It is not possible to make precise projections of the demand for machine tools in the U.S. because many of the determinants of demand are unpredictable. For example, purchases of machine tools usually attain a peak during war years, and the pattern of machine tool demand in the U.S. has been greatly influenced by the military build-up in World War II, the Korean War, and the Vietnam War. The machine tool industry is also subject to cyclical changes in demand. After each war-time period of high demand for machine tools to expand the capacity of

the metalworking industries, there has been a decline in new orders for machine tools, and there are fluctuations during peace time also.

Nevertheless, it is possible to describe some of the probable developments. Moreover, in order to evaluate the export potential of Indian machine tools to the U.S. market it is not necessary to determine the size of the market with any precision. From the point of view of India, the U.S. market is so large that the success of Indian exports will depend more on India's ability to offer competitive terms of sales (price, quality, delivery, service, etc.) than the exact size of the total market. Of course, the task would be easier if demand were higher, but a very high level of demand for machine tools is neither a necessary nor a sufficient condition for success of Indian exports to the U.S. market. Much more important is whether India can offer more attractive terms than are available on Japanese, Italian, or used machines, and whether India engages in the necessary marketing efforts.

Nevertheless, it will be useful to consider the following determinants of demand.

1.3.1 Past Levels of Demand

Since 1964, the volume of domestic purchases of machine tools (domestic shipments less exports plus imports) has been:

Table 6

Annual U.S. Purchase of Machine Tools

(\$ millions)

1964	..	1,047
1965	..	1,343
1966	..	1,657
1967	..	1,853

Source: Bureau of the Census, U.S. Department of Commerce, Current Industrial Reports, M35W (Shipments); Report FT 135 (Imports and Exports).

From this data one might project that, if there is no major change in the determinants of demand for machine tools other than steady growth along with the rest of the economy, purchases of new machine tools would soon reach \$ 2,000 million per year. On the more conservative side, it must be remembered that purchases in 1965-67 were inflated by the Vietnam War, and a slowing of the rate of growth of the economy would lead to a sharp drop in the level of machine tool purchases. For example, between 1956-57 and 1958-59, purchases of machine tools temporarily fell by over 50%, and it is not impossible that this could happen again.

However, most forecasters are predicting a level of machine tool purchases of \$ 2,000 million per year or more by 1975. Included among these is A.J. DeWolf, past President of the NMTBA and President of the machine tool building company Dreis & Krump Manufacturing Co., who predicted recently that new orders for machine tools will hit \$ 2,000 million by 1975, and on another occasion gave a "conservative estimate" that orders for machine tool would average at least \$ 1,500 per year for the period 1968 through 1973.

1.3.2 Level of Excess Capacity

In analysing the determinants of demand, the first significant statistic is the existing utilization of capacity in the metalworking industries. Other things equal, the higher the present level of capacity utilization, the higher the demand for machine tools will be in coming years. According to American Machinist, (Jan. 15, 1968), on the average the metalworking industries exceeded the preferred rate of utilization of capacity (95 percent) during 1966. However, due to expanded metalworking capacity and a slight decline in production below the peak level of late 1966, capacity utilization was an average of 10 percent below the preferred level by late 1967, and completion of new projects continued to increase excess capacity in 1968. As a result, in 1968 there was a decline in new orders for machine tools to expand capacity compared to the level of 1965-66.

However, this excess capacity was not evenly distributed, ranging from negligible in instruments and aircraft and transportation other than motor vehicles to 30 percent in motor vehicles. These figures indicate that although there is currently a reduced level of demand for machine tools for expansion of capacity, excess capacity is not so great that it will depress demand for machine tools over the next decade. Excess capacity of 10 percent would be wiped out by a moderate growth of industrial production over a couple of years, and it is small compared to the increased capacity that will be required in the next decade. Also, although few users are operating much overtime, some firms and

industries do not have much excess capacity and so will be in need of machine tools for expansion. The U.S. automobile industry is expecting a high level of production in 1969.

1.3.3 Replacement Market for Machine Tools in the U.S.

In the past few years, particularly in the second half of 1965 and in 1966, the market for machine tool in the U.S. was dominated by demand to expand capacity in the metalworking industries. Because the level of demand for machine tools for expansion of capacity depends on the rate of increase of demand for metalworking output, the demand for machine tools is subject to large cyclical variations.

However, there is another source of demand for machine tools in the U.S. which has also been important in recent years and which will help maintain a high and rising level of demand for machine tools during the next decade. This is the demand for new machine tools to replace existing ones which have worn out or become obsolete.

The significance of replacement by newer and more productive machines is evident from the fact that despite purchases of \$ 5,900 million worth of machine tools in 1964 through 1967, the total number of machine tools installed increased only from 3.28 to 3.39 million, or 107,000 units between the 1963 and 1968 inventories. While the number of machine tools increased by only 2.2% the value of production measured in constant dollars by the American Machinist Production Index went up by 30%. Over a longer period, from 1945 to 1968, the number of machine

tools increased by 39% while output in constant dollar increased by 122%. Only 30% of the equipment installed in metalworking plants at the end of World War II is still there; the rest has been sold to maintenance shops in other industries, sold to training schools, exported, or scrapped. Metalworking equipment outside metalworking plants tends to be older, and is oldest in training uses.

However, to a greater extent than in the case of demand for machine tools to expand capacity, the replacement demand will focus on automated and sophisticated machine tools⁽¹⁾. Standard machine tools will benefit to a much lesser degree. This is because, of the two factors behind replacement demand - wear and obsolescence - the latter is more important for machine tools. The physical life of a machine tool can be prolonged almost indefinitely by repair and rebuilding to offset the effects of wear. However, the economic life of a machine may be cut short by economic or technical developments. Economic obsolescence in machine tools is primarily a result of rising labour costs, which make it profitable to install faster and more automated machinery and machinery with lower set up time. Technical obsolescence results from the development of new tasks which cannot be done on old machines (because they require faster speeds, greater precision), improved design, and the development of more efficient methods of metal removal, operation, transfer, or control which permit reduction of manufacturing costs.

(1) According to Mr. Trecker, President of Kearney and Trecker Corporation, in 1966 "standard machines are still mainly being purchased for plant expansion, but numerical control machines are mainly in the category of modernization".

Both economic and technical obsolescence point to demand for more sophisticated machine tools rather than standard ones. Moreover, the replacement demand will give rise simultaneously to a large supply of used standard machines available at lower prices and competing with new conventional machine tools. Thus, replacement will not be a major source of demand for Indian machine tools and will even generate a competing source of supply.

In 1968 the replacement and modernization markets were the major sources of demand for machine tools because during 1965-67 customers had temporarily satisfied their demand for machine tools to expand capacity. This was a **stable** but not booming demand, and new orders for machine tools were lower than 1967.

According to A.J. DeWolf, "in most years a major portion of the money invested in new machine tools and other production equipment is for replacement and modernization. In other than extreme peak periods of activity, the proportion of total dollars for modernization ranges between 60 and 70 percent, and only 30 to 40 percent goes for brand-new capacity. Whenever operations in any segment of our metalworking industry reach around 85 percent or higher, you can be sure that considerable machine tool buying will be for new capacity". He estimates that while 56% of non-electrical machinery capital spending was for modernization in 1966, the proportion was 65% in 1967-69, and would be 70% in 1970.

However, because the existing inventory of machine tools in the U.S. contains a large share of old machines, it is universally predicted that the replacement market will prevent any sharp drop in machine tool orders in the next several years.

A.J. DeWolf, while President of the NMTBA in 1967, suggested that, conservatively estimated on the basis of the 1963 inventory of machine tools, there is a potential replacement market of \$ 8,900 million for machine tools in the U.S., or four and half years of capacity-level production by the U.S. industry⁽¹⁾. His calculation is as follows:

- (1) In 1963 there were 451,000 metalcutting machine tools in operation which were over 20 years old. With a U.S. Department of Commerce average price of \$ 10,000, and on the basis of a one-for-two replacement, there is over \$ 3,400 million of replacement business available.
- (2) There were 156,000 metalforming tools over 20 years old. Replacement of these machine tools on a three-for-four basis and at an average price of \$ 16,000 would result in over \$ 1,800 million in business.
- (3) Nearly \$ 3,700 million in business will be available in replacement of metalcutting tools between 10 and 20 years old, on the basis of a one-for-two replacement of half the inventory.

Statistics on the age distribution of machine tools in U.S. metalworking industries are contained in the Tenth American Machinist Inventory of Metalworking Equipment (1968), based on equipment lists furnished by metalworking plants. The 1968 inventory revealed that almost 1.85 million or 64% of the 2.87 million machine tools in U.S. metalworking industries were at least 10 years old and of these 0.67 million or 23% were over 20 years old.

(1) "Sales Unlimited", NMTBA, May, 1967.

Table 7

Age Distribution of Machine Tools in U.S.
Metalworking Industries, 1968

	<u>Number</u>	<u>Age</u>	
		<u>10 Yrs & Over</u>	<u>Over 20 Yrs</u>
Metal-cutting	2,175,309	63%	23%
Metal-forming	694,479	68%	26%
Total ..	<u>2,869,788</u>	<u>64%</u>	<u>23%</u>

Source: Tenth American Machinist Inventory of Metalworking Equipment, 1968.

The successive American Machinist inventories indicate a significant aging of the U.S. machine tool stock from 1945, when 41% of the units were at least 10 years old, to 1963, when 64% were at least 10 years old. There was little change in percent under 10 years old from 1963 to 1968.

Table 8

Percent of Units in the U.S. Machine Tool Stock at least
10 years Old

<u>Year</u>	<u>Percentage</u>
1945	41
1949	46
1953	56
1958	60
1963	64
1968	64

Source: Tenth American Machinist Inventory of Metalworking Equipment, 1968

With 64% of its machine tools at least 10 years old, in 1963 U.S. equipment was older than that in other advanced countries at about that time : Britain (62% at least 10 years old in 1966), France (58%), Italy (57%), West Germany (55%), Russia (50%)

Moreover, a detailed breakdown by type of machine tool (see Appendix 5) shows that the aging covers the full range of machine tools. However, when broken down by industry (see Appendix 6, there is a wide variation in the age of the machine tool stock, ranging from communication and electronics equipment with only 52% of machine tools at least 10 years old to farm machinery with 78%.

The conclusion which is universally drawn from these statistics is that a high percentage of machine tools in U.S. metalworking industries is obsolete, and many metalworking industries could reduce production costs by investing in new machinery. This provides the basis for optimistic projections of the volume of replacement demand for machine tools in the next decade. Of course, it should be remembered that many old machine tools will not be replaced because they are used only for occasional jobs, rough work, or to give the firm flexibility in its capacity, and users can rebuild old machines rather than buy new ones.

1.3.4 Financial Situation of U.S. Business and Government Investment Incentives

Demand for capital goods by business depends on the availability and cost of funds as well as the return on investment. In the U.S. recent interest rates of 6-7% on long term corporate bonds have been the highest in decades. However, internal funds from profits are high and provide the major source of investment funds for U.S. business.

There is an investment tax credit of 7% of the purchase value of new capital goods, and there are accelerated depreciation provisions for writing off investments against tax liabilities. These increase both the incentive to invest and the funds available for investment.

1.3.5 Demand for Standard vs. Sophisticated Machine Tools

(1) Number of Numerically Controlled Machine Tools Installed

The trend in the U.S. is strongly toward more automated equipment and numerical control. Although there was a marginal decline in NC shipments in the U.S. from 1966 to 1967, a continuation of the upward trend is universally predicted. The increasing use of sophisticated machine tools and capital equipment in general in the U.S. and Canada is explained in part by technological developments in the design of machine tools, where the U.S. is a world leader, in part by the types of metalworking operations that must be performed, and in part by the increasing level of labour costs.

According to the American Machinist, in mid-1968 there were 14,190 numerically controlled machine tools in about 3000 plants in the U.S., compared to 4,800 - 5,200 NC tools in Western Europe at the end of 1967 and 288 in Canada in mid-1968. According to the JMTBA, in 1968 there would be about 500 NC machine tools in operation in Japan. (Iron Age, Sept, 5, 1968, p.12).

According to the Business and Defence Services Administration of the U.S. Department of Commerce, a total of 13,096 NC machines were shipped by U.S., manufacturers through Dec. 31, 1967. This compares rather closely with the American Machinist Inventory, which shows 14,259 NC units installed in US metalworking industries in June 1968, counting machine tools and other metalworking equipment with NC.

According to the Iron Age, about 40% of the U.S. machine tools at the 1968 ASTME show had NC. (Iron Age, May, 1968). At the 4th International Machine Tool Fair in Tokyo in 1968 there were to be 60 Japanese NC machines on display. (Iron Age, Sept. 5, 1968, p. 12).

Table 2 shows a breakdown of the 1968 inventory of NC machines by type. Out of the total of 14,190, fully 13,698 or 96.5 per cent were metalcutting types and only 492 or 3.5 per cent were metalforming types. More than 98% of existing NC equipment is less than 10 year old. Assuming all units with NC were under 10 years old, the 14,190 machine tools with NC would account for 1.4% of the new units installed during the decade before 1968, and the 13,698 metalcutting machines with NC would account for 1.7% of the metalcutting machines installed in the last decade..

As of December 31, 1967, 15.1% of NC units had contour capability, and the percentage was gradually increasing, largely because of the increasing percentage of NC on lathes, most of which are equipped with contouring capability.

The largest number of NC machine tools by type were multi-function machining centres, followed by drilling machines. It should be kept in mind that most modern NC drills are capable of at least light milling, and other machines have similar versatility. There is a strong trend toward increased application of NC to lathes.

Table 9

Inventory of Numerical Control Machine
Tools in the U.S. by Type 1968

<u>Type</u>	<u>Total of units under 10 years</u>	<u>Units with NC</u>	<u>Units with NC as a per cent of units under 10 years</u>	<u>Units of this type with NC as per cent of all units with NC</u>
<u>Metalcutting Machines</u>	<u>795,738</u>	<u>13,698</u>	<u>1.7</u>	<u>96.6</u>
Multi-Function machines	6,248	4,145	66.3	29.2
Drilling Machines	142,689	3,221	2.3	22.7
Milling Machines	105,872	2,356	2.2	16.6
Turning Machines	143,737	2,033	1.4	14.3
Boring Machines	18,414	1,728	9.5	12.2
Automatic Assembly Machines(all types)	9,668	74	0.8	0.5
Grinding Machines	181,659	50	0.0	0.4
Special-way-type Machines	7,247	34	0.5	0.2
Gear cutting and Finishing Machines	9,171	22	0.2	0.2
Tapping Machines	14,200	10	0.0	0.0
<u>Metalforming Machines</u>	<u>225,640</u>	<u>492</u>	<u>0.2</u>	<u>3.4</u>
Punching and Shearing-Machines Power	27,614	404	14.6	2.8
Bending and Forming Machines-Power	34,092	42	0.1	0.3
Riveting Machines (not Portable)	22,630	15	0.6	0.1
Mechanical Presses- Power (exc. forging)	82,548	11	0.1	0.1
Total		14,190		100.0

Source: Tenth American Machinist Inventory of Metalworking Equip-
ment, 1968

Some NC machine tools are becoming almost standard : in 1967 Cincinnati Lathe and Tool Co., delivered its 1001st vertical Cincinnati NC machining center.

In 1966, automated and numerically controlled machine tools accounted for \$ 250 million, or slightly less than 1% of shipments by U.S. manufacturers by number but, with an average price of \$ 85,000 (including controls) as opposed to \$ 5,300 for all machine tools, over 14% of shipments by value. For metalcutting tools they represented close to 20% of shipments by value. (See Table 10 and 10a).

American Machinist reports an estimate that there will be 28,000 numerically controlled machines in 5,500 plants by the end of 1970 and 50,000 in 10,000 plants by the end of 1975. If one assumes a price of \$ 100,000 each, this means installation of \$ 2,200 million in NC equipment between 1970 and 1975, or an average of \$ 440 million per year. According to the Tool and Manufacturing Engineer (December, 1967), it has been estimated by A.J. DeWolf, past President of the NMTBA, that 80% of shipments by value will be numerically controlled by 1975. In Iron Age (August 15, 1968), it is predicted that "by 1975 NC machines will be the dominant tool, accounting for about \$ 1.4 billion in sales" annually. Warney & Swasey, a large U.S. machine tool manufacturer, estimated in 1968 that "the company's numerically controlled machine tool line could account for 70% of the firm's metal-cutting equipment production within the next decade". (Iron Age, October 17, 1968, p. 29). Iron Age says "some observers believe that

Table 10

Numerically Controlled Machine Tools Shipped by U.S. Builders, 1954-1966

Items	1954-63		1964		1965		1966		1964-66		1954-66	
	(units)		(units)		(units)	(Value, \$ '000)	(units)	(value, \$ '000)	(units)		(% of total units)	
Total numerically controlled machine tools	3,583		1,517		2,100	159,289	2,939	249,069	10,159		100.0	
By type of numerical control:												
Point-to-point positioning	2,473		1,145		1,604	88,999	2,044	126,377	7,271		71.7	
Continuous path contouring activated by punch cards	441		172		229	43,648	524	79,510	1,366		15.5	
Dial or plug-board type of pre-recorded motion programme control	664		200		267	26,642	371	43,182	1,502		14.8	
By type of machine tool:												
Drilling machine	1,690		821		924	34,056	1,158	49,847	4,593		45.3	
Boring machines	636		198		274	32,204	489	52,433	1,597		15.8	
Lathes	402		273		496	29,750	639	40,420	1,810		17.9	
Milling machines	540		146		245	40,567	453	75,257	1,384		13.6	
Other	315		79		161	22,712	200	31,112	755		7.4	

Note: Values are for machines complete with controls, which represent about 20-25% of the cost of numerically controlled machines.

Source: U.S. Department of Commerce, Current Industrial Reports.

1954-63: BDSAF - 630 (63) - 1

1964-66: M35W. Data for 1964-66 includes automatic mechanical machine tools as well numerically controlled tools.

Total Shipments of Numerically Controlled and Automatic Mechanical Metalworking Machinery in the U.S. By Type of Control and Type of Machine, 1965-66

Item	1965		1966			
	Number	Value	Machines and controls	Value		
		(\$1,000)		(\$1,000)		
			Controls only	Controls only		
METALWORKING MACHINERY, TOTAL	2,100	159,289	43,943	2,939	249,069	55,485
By type of numerical Control:						
Point-to-point posi- tioning	1,604	88,999	25,925	2,044	126,377	26,059
Continuous path activated by tape or punch card	229	43,648	13,845	524	79,510	22,923
Dial or plugboard type of prerecorded motion program control	267	26,642	4,173	371	43,182	6,503
By type of machines:						
Boring machines, total	274	32,204	9,634	489	52,433	12,173
Point-to-point positioning	149	17,252	5,785	324	33,422	7,030

Item	1965			1966		
	Number	Value (£1,000)		Number	Value (£1,000)	
		Machines and controls	Controls only		Machines and controls	Controls only
Continuous path activated by tape or punch card dial or plugboard type of pre-recorded motion program control	125	14,952	3,849	165	19,011	5,143
Drilling machines, total	924	34,056	10,797	1,158	49,847	11,046
Lathes, total	496	29,750	7,280	639	40,420	7,893
Point-to-point posi- tioning) Dial or plugboard type) of prerecorded motion) program control)	414	20,020	4,124	454	21,882	4,171
Continuous path acti- vated by tape or punch card	82	9,730	3,156	185	18,558	5,722
Milling machines, total	245	40,567	13,384	453	75,257	21,855
All other metal cutting and metalforming type machine tools, total	161	22,712	2,848	200	31,112	2,558

Item	1965			1966		
	Number	Machines and controls	Value (\$1,000)	Controls only	Machines and controls	Value (\$1,000)
Point-to-point positioning	110	9,774	2,072	-	-	-
Continuous path activated by tape or punch card dial or plugboard type of prerecorded motion program control	51	12,938	776	-	-	-

Source: U.S. Department of Commerce, Bureau of the Census, Business and Defense
Services Administration, Current Industrial Reports, M35V.

by 1975, 70% of all machine tools made in this country will be numerically controlled." (October 17, 1968, p. 56).

In Canada the use of numerically controlled machine tools in relation to other machine tools is not as widespread as in the U.S. In mid-1968 Canada had only 288 numerically controlled machine tools in 120 plants, or slightly less than 2% of the number of numerically controlled machine tools in the U.S.

Table 11

Installation of Numerically Controlled
Machines in Canada, 1959-1968

<u>Year</u>		<u>Number of</u> <u>Installations</u>
1959	..	5
1960	..	2
1961	..	6
1962	..	2
1963	..	12
1964	..	17
1965	..	45
1966	..	58
1967	..	66
1968 (half-year)	..	<u>61</u>
	Total	<u>274</u>

Source: Canadian Machinery and Metalworking, July, 1968

(2) Disincentives and Incentives to Use Numerical Control

The most important trend in the application of advanced technology to machine tools is the use of numerical control, which is being applied to an increasing range of machine tools and which is

accounting for an increasing share of machine tool shipments in the U.S. In NC equipment, positioning of workpiece and/or cutting tool, speeds, feeds and even tool selection are automatically controlled by a pre-set program. In order to evaluate the effect of this trend on the demand for conventional, manually operated machine tools, it is necessary to consider the economic and technical incentives and disincentives to use numerical control.

The primary disincentives to use in NC are:

- (a) The higher initial cost of numerically controlled machines. In the U.S. the average value of the numerically controlled machine tools shipped in 1966 was almost \$ 85,000. Most NC machining centers sell for \$ 100,000 and up. The high purchase price creates financing problems for many small shops.

However, in 1968 Bergmaster, division of Houdaille, Los Angeles, introduced an eight-spindle two-axis turret type NC machining center for \$ 35,000 and planned a three-axis contouring machine for \$ 50,000 (Iron Age, August 22, 1968, p.26). A major reason for the cost cut is that the machine will be produced in standard models and in relatively large quantities.

So far the market for small shop NC systems has been barely touched, but in 1968 a number of suppliers introduced equipment aimed at this market. Large builders tend to produce equipment that small shops cannot afford. However, there are several small suppliers which make NC controls suitable for retrofitting on to small, inexpensive machine tools.

Coleman Engineering Co., Santa Ana, Calif., makes a simple point-to-point positioning NC control suitable for milling machines made by Bridgeport, (U.S.A.) Index, Beaver (U.K.), Condia (Spain), and others and priced about \$ 16,000.

Coleman sold over 75 units in the first year after it was introduced in 1967. (Iron Age, August 29, 1968, p. 24).

Superior Electric Co., sells its Slo-Syn NC two and three-axis units for retrofitting on small milling machines, and R.G. Gardner, HMT's Canadian distributor, plans to combine these with HMT milling machines (Iron Age, Oct. 10, 1968, p. 102). Ex-Cell-O of Canada sells its 602 milling machine

with two-axis point-to-point NC control for \$ 13,600, compared to \$ 3,000 without. Increasing volume can be expected to bring substantial reductions in the price of NC machines and controls, and thus increase the competition for conventional machines.

- (b) The longer delivery period required before numerically controlled machines are shipped to the customer.
- (c) The higher skill level required for maintenance and programming and efficient planning of jobs on the machine. For metalworking shops not familiar with NC, training is necessary. (Iron Age, June 27, 1968, p. 12).

Thus it has been estimated that a machining center should produce at least three times as many parts per hour as a conventional machine tool. Otherwise it's not paying its way. Most users of these machines quickly see the value of spreading the purchase price over three shifts. Today people commonly talk about spindle turning times of about 50% for N/C machines. Many feel that machining centers, which sell for \$ 100,000 and upwards, should have 80% chipcutting time. To achieve this, the company must have a large inventory of proven NC tapes to prevent idle time. This is why a prime NC market - the small independent job shop - is not yet a major market for machining centers. The larger shops have been the main market for all units shipped to date. Lately, however, machines tailored for small-shop budget have made inroads into the more sophisticated job shops. Most builders also believe the five to 20 man shops could also develop into a market for machining centers with automatic tool changers. (Iron Age, June 20, 1968, p. 77).

The following is a list of the advantages most commonly claimed for numerical control. Of course, not all will be realized in each case:

- (a) Numerically controlled machinery can be operated by a worker who has less skill than is required to operate a conventional machine tool, since both manual operations and decisions by the operator are more restricted. This reduces labour costs. According to John C. Hassing, at American Tool Works Co., they "have taken men from farms and filling stations and trained them to operate N/C equipment in a few weeks - much faster than a manually operated machine."

- (b) The time required to machine a part on a numerically controlled machine is lower than for a conventional machine because of faster metal removal or punching and reduced idle time between steps required for positioning, tool changing etc., especially on a machining center with automatic tool changer and working cycle which does work previously requiring several separate manual operations on different machines and manual changes of tools.

According to one estimate, most general purpose machines make chips only 18% of the time while NC machines with automatic tool changer can make them 50 - 80% of the time. (Iron Age, June 20, 1968, p. 80).

John M. Sheesley, president of Bettis Corp., Houston said "we used to handle our housings on as many as 10 different manual machines and sometimes it took a week to get a job through the shop. With a automatic (NC machine) we do all operations in a single setup - in a matter of minutes."

This reduces labour costs and capital costs (i.e., the time capital is tied up per part) as well.

In the case of production of New Britain Machine Co., numerically controlled tools have reduced machining times by 40-50%. At Service Machine Co. it was 25%. At Smithtown Metal Products Corp., it was 50% overall on a part and 80% on drilling (Tenth American Machinist Inventory, Nov. 18, 1968, p. 32).

Mr Sedler, Vice President of R & K Precision Machine Inc., which has seven R/C machining centres, says they "handle most jobs in one-third the time a manual machine would take". (Iron Age, June 6, 1968).

For Allis - Chalmers, an NC turret punch press cut punching time by more than 50% (Iron Age, June 6, 1968, p.8).

Moreover, according to Mr Fred Hunte of Alliance Tool & Die Corp's Advanced Machining Div., an NC user, "even if operating cycle time on R/C machines was no shorter than on manual machines, you would still be in a better position with N/C because one tape machine can now mill, drill, tap, ream and bore. Conventionally, you would have to go to a bank of machines and wait for an opening on each machine. Two days of waiting time for each machining function would be considered expeditious scheduling on conventional machines". (Iron Age, July 4, 1968, p. 61).

- (c) Less special tooling and fewer jigs and fixtures are required for numerically controlled machines, which can often use universal tooling, than is typically used on conventional machine tools to do the same job. This reduces the investment in tooling (which is a very substantial share of investment), space required to store tooling, and lead times and labour requirements for production of fixtures and tooling set-up and tool maintenance. This means lower capital and labouring costs.

For one product made at Kearney and Trecker, use of numerically controlled equipment reduced investment in tooling by over 50%, or more than \$ 100,000. C.A.E. Industries, Ltd., of Montreal reported a 50% reduction in tooling costs. For one part, Smithtown eliminated a drill jig that cost \$ 6,000 and substituted only \$ 50 of fixtures. (Tenth American Machinist Inventory, Nov. 18, 1968, p. 32).

In comparison to conventional machinery without special tooling, while numerically controlled equipment involves a larger investment in tooling, it has an even greater advantage in reducing set-up and machining time and costs.

NC gives management a faster reaction time in new product development. Since NC machines use relatively simple fixtures, prototypes can be machined immediately and be in production within days. Conventional machines may be held up for weeks while jigs and fixtures are prepared for all the separate mills, drills, and boring machines required for the same job.

Of course, the first time an NC programme is run there is programming time and then often a certain amount of idle time of the machine while a pilot run is made to check the programme, and additional machine time is lost if debugging and corrections are necessary. (Iron Age, June 27, 1968, p. 70).

A Wiedeman NC turret punch press installed at Allis-Chalmers Construction Machinery Division "eliminated die sets, templates, multiple tooling, layout, set-up, multiple handling, excessive planning and other drawbacks." It cut set-up time by more than 75% for an Allis-Chalmers part. (Iron Age, June 6, 1968, p. 8).

- (d) Leadtimes in production are reduced because of (b) and (c). This means capital costs of material and labour in inventories can be reduced for goods in process, semi-finished goods, and finished goods. This is partly because with a

shorter production process fewer units are in the production pipeline at any given time; it is also because, with a shorter pipeline, the company does not have to fear that it will be caught short if it does not hold large inventories of semi-finished and finished goods.

Moreover, NC is economical for smaller lot sizes than is production on conventional machines with special jigs and fixtures and long set-up times, and hence it is possible to produce small lot sizes in exactly the number needed rather than less frequent large lots, most of which must be stored in inventory.

This reduces working capital costs and required storage space. It may also mean the user is able to meet contract delivery dates that would otherwise be impossible, and hence he may get additional orders. Alliance Tool & Die Corp.'s Advanced Machining Division reduced the average time to process a batch of EDM machines by over 25% when it switched from conventional machines to NC machining centres. (Iron Age, July 4, 1968, p. 61).

- (e) Less time is lost due to initial operator inexperience with numerically controlled equipment, because the operator plays a less important role. That is, the machine operator's learning curve is practically eliminated. Before numerical control, it often took a couple of lots before routines could be established.
- (f) Numerical control allows greater flexibility of plant capacity. Instructions are completely programmed and can be easily changed or stored. There is virtually instant change-over to different or modified workpieces simply by changing tapes. As a result, production runs can easily be interrupted by emergency jobs or small jobs can be done economically.

Most NC machines have a wide range of capabilities, e.g. drilling machines can do light milling and boring, turning machines have turret heads and boring capability, and many are multi-function machining centres.

- (g) Numerical control involves a high accuracy of positioning and in many cases involves a high degree of automatic measurement, and thus it leads to improved quality and precision of parts. Rejection rates are reduced. Inspection time is cut. Secondary operations are eliminated. Parts produced are exactly alike and interchangeable, which reduces assembly time and which is particularly important if replacement spare parts must be produced later. Some firms sub-contract only

to firms that use numerically controlled equipment. Also, some aircraft and auto companies give sub-contractors NC tapes for the parts they want produced. As a result, those interested must have NC (Iron Age, Sept. 5, 1968, p.53).

According to Robert M. Kirsch, vice-president of Smithtown Metal Products Corp., Bohemia, Long Island, N.Y., owner of two Cincinnati Lathe and Tool Co. Cintimatic vertical N/C machining centres, "The Cintimatics have sharply improved accuracy and repeatability. And since our customers know they hold tight tolerances, we get more precision business than we used to". (Tenth American Machinist Inventory, November 18, 1968, p.32).

- (h) With numerical control it is sometimes possible to have one operator run two or more machines, thus reducing labour costs.

(3) Applications of Numerically Controlled Machine Tools

Numerically controlled machine tools so far have had their major benefits in short run production of complex workpieces, a situation where a single NC tool often replaces several conventional ones.

(a) Small lot, short-run jobs

A large percentage of the units of numerically controlled equipment are being used by jobshops, or firms doing small-lot orders. Studies have shown that at the labour and capital prices in North America, NC equipment is often the most economical means of production when lots have between 5 and 200 identical units. For smaller lots, the time required for programming NC equipment may make it impractical. For larger lots, or mass production, fully automated production is more economical. C.A.E. Industries Ltd., Montreal uses NC on lots of one to 100 electronic equipment parts.

Particularly significant is the combination of NC and automatic tool changers. This makes many NC machines capable of performing a wide variety of metal-cutting operations. "The basic concept is simple and powerful : For short-run production, build the machine to automatically handle all the tools needed to make a finished part from an uncut workpiece." (Iron Age, June 20, 1968, p.75).

Tool changers are most common on machining centres which mill, drill, bore, tap, and ream, but they are becoming available on turning, grinding, and broaching machines. A five-axis unit can cut complex contours and intricate hole patterns in up to five sides of a workpiece in one set-up. Some machines automatically change up to 134 tools. As of 1968, 12 US builders offered 34 standard models of machining centres with automatic tool changers.

(b) Machining parts with complicated shapes

The economical range of lot sizes for NC equipment is wider when the part to be made involves complicated profiling and positioning. Thus, NC may be economical for production of a single part or lots with over 200 units.

(c) Flexibility

The flexibility of NC machines, particularly machining centres, makes them very suitable for job shops, which require versatile tools with a wide range of capabilities because of the wide variety of machining operations in small batches done in such shops.

(d) Type of machining operation

Tables 9 and 10 show the U.S. inventory and shipments of NC machines by type. In metal-cutting the advantages of NC are greatest for boring, drilling, and milling operations, and the greatest application of NC has been in these areas, including machining centres which combine these operations in a single machine. However, the advantages of NC are sufficient for other operations, including turning, that NC is being extended increasingly to machine tools like lathes and turret lathes.

NC is also being applied to metalforming, particularly punching. An example of NC applied to metal forming is the Warner and Swasey Weidemann NC tape controlled 40-ton 30-station turret punch press, designed for short-run production of 5 to 300 components. (Iron Age, June 6, 1968, p.8). Another is the Strippit Fabramatic 40-ton NC hole punching and notching machine capable of punching 5" diameter holes in sheet metal 1/4" thick. Yet another is the GFM (Austria) forging machine with four eccentrically driven hammers. (Iron Age, Sept. 10, 1968, p.98) NC is also being applied to welding machines.

(e) Used machines

Although most units with NC were designed specially for this purpose, NC systems can be retrofitted to some existing machines which were not specifically designed for it. Of course, since the machine tools were not designed for NC, generally they will not make optimum use of its potential.

A number of machine tool builders are marketing machines, which were designed for NC, without the control unit. The control unit can be fitted later.

(4) Users of NC Machine Tools

Numerically controlled machine tools so far have had their major benefits in short-run production of complex workpieces, a situation where a single NC tool often replaces several conventional ones. Most of the NC machines are in the machinery building industries that face this combination of manufacturing problems.

There is only one market where NC machines are not found. That is among users who simply cannot afford the purchase price of such machines and cannot buy them on credit even though the machines have economic applications. However, a certain number of numerically controlled machines can be found everywhere else.

A large percentage of the units of NC equipment are being used by job-shops, or firms doing small-lot orders. This includes both large and small firms, although it may be harder for small firms to purchase NC equipment because of limited financial resources. (See Iron Age, Sept. 5, 1968, p.53). Despite the capital costs, NC equipment is used by some small job-shops such as the tool and die industry;

This is particularly true of units with point-to-point positioning, which are lower priced than units with continuous path contouring requiring built-in computer assists to interpolate coordinates between those actually programmed. Also some technical training schools have NC equipment, since training is given on advanced as well as simple machines. Thus, there is one NC machine in each of nine Canadian research institutes, universities, technical colleges, or technical training schools. (1) (See Canadian Machinery and Metalworking, July 1968).

Table 12 shows the U.S. inventory of NC machine tools in 1968 by industry. This shows the major role of the machinery industries and producers of aircraft engines and parts as users of NC machine tools. Among the different industries at the 3-digit SIC level of breakdown the aero-space industry is the most important user of numerically controlled machinery. In the U.S. in 1966 there were 800 to 900 numerically controlled machines, or 12.5% of the total number, installed in aero-space plants. Between 1954 and 1963 (see Table 13) 629 numerically controlled machines, or 17.5% of the total units, were purchased

(1) British Columbia Institute of Technology, Burnaby, B.C.;
Centennial Centre of Science and Technology,
Don Mills, Ontario;
Lakehead University, Fort William, Ontario;
National Research Council, Ottawa, Ontario;
North Alberta Institute of Technology, Edmonton, Alberta;
Ottawa Technical High School, Ottawa, Ontario;
Ryerson Polytechnical Institute, Toronto, Ontario;
University of Alberta, Edmonton, Alberta;
University of British Columbia, Vancouver, British Columbia.

by the aircraft and parts industry (SIC 372). Their average price was \$ 125,000, or some 50% above the overall average. A high percentage of these machines have been financed by the U.S. Air Force for contractor's plants as part of its modernization programme. The U.S. Army prefers contractors who use numerically controlled equipment on Army contracts, and some prime contractors subcontract only to firms that use numerically controlled equipment. In Canada, several of the firms with the largest number of numerically controlled machine tools are in aero-space, including Aviation Electric (6 numerically controlled units), Douglas Aircraft Co. of Canada (11) and United Aircraft (Canada) Ltd. (18).., and another with 22. These four companies alone have one-fifth of the numerically controlled units in Canada, and they are not the only aero-space firms with numerically controlled equipment.

Table 12 shows the number of NC units in each industry. It is noteworthy that "miscellaneous machining (except electrical) and parts", the industry usually described as "job shapes", has 1524 NC machine tools, or over 10% of the total. By contrast, the household appliance industry which operates on a mass-production basis, does not have any NC machines.

High production operations - the Detroit transfer lines - have no room for the relatively slow NC machine. However, NC readily finds a place in the automotive plants, in secondary or rework operations, prototype or model actively, and the production of replacement parts. Further, some tool changer machining centers appear to be

Table 12

Numerically Controlled Machine Tools Installed in
U.S. Metalworking Industries 1968

	Number of NC Machines		
	<u>Total</u>	<u>Metalcutting</u>	<u>Metalfforming</u>
<u>Ordnance and accessories</u> ..	531	519.	12
<u>Metal furniture and fixtures</u>	*	*	*
<u>Primary metals industries</u> ..	198	198	*
<u>Fabricated metal products</u> ..	992	864	128
Cutlery, handtools, hardware	82	82	*
Heating, plumbing fixtures	*	*	*
Fab.structural metal products	426	340	86
Screw-machine products ..	*	*	*
Metal stampings ..	63	41	22
Misc. Fab. metal products..	410	391	19
<u>Machinery, except electrical</u>	6,834	6,727	107
Engines and turbines ..	400	400	*
Farm machinery & equipment	48	44	*
Construction,mining, matl-hdlg	727	719	*
Metalworking machinery ..	1,792	1,778	14
Special-industry machinery	1,297	1,281	15
General industrial equipment	626	626	*
Office machines ..	301	289	12
Service-industry machinery	120	85	35
Misc.machinery, except electrical ..	1,524	1,505	19
<u>Electrical machinery & equipment</u>	2,467	2,284	183
Electrical equipment ..	962	879	81
Household appliances ..	*	*	*
Communications, electronic equipment ..	1,505	1,404	101
<u>Transportation Equipment</u> ..	2,713	2,685	28
Complete motor vehicles ..	52	50	*
Automotive parts accessories	132	127	*
Complete aircraft ..	326	326	*
Aircraft Engines & parts ..	2,182	2,169	13
Ships, boat, railroads eqpt.	21	13	*
<u>Precision Instruments</u> ..	363	348	15
<u>Miscellaneous Mfg. industries</u>	85	66	19
<u>Total</u> ..	14,190	13,698	492

* Less than 10 units

Source: Tenth American Machinist Inventory of Metalworking Equipment 1968.

Table 13

Numerically Controlled Machine Tools Shipped by U.S. Manufacturers,
by end User Industry, 1954-63

Standard Industrial Classification	Industry Description	Number of Numerically Controlled Machine Tools Shipped, 1954-63				Total
		Point-to-point Positioning	Continuous Path Control	Dial or Plugboard type, etc.		
19	Ordnance and Accessories ..	75	43	17	135	
33	Primary Metal Industries ..	N.A.	N.A.	N.A.	29	
34	Fabricated Metal Products ..	191	35	47	273	
35	Machinery, except Electrical ..	1,189	93	261	1,543	
36	Electrical Machinery	293	16	26	335	
37	Transportation Equipment ..	485	222	152	859	
38	Instruments and related products ..	55	N.A.	N.A.	68	
--	All other, including exports, educational institutions, and U.S. Government ..	N.A.	N.A.	N.A.	341	
--	Total ..	2,478	441	664	3,583	

Note : N.A. means Not Available

Source : U.S. Department of Commerce, Current Industrial Report, BDS4F-630(63)-1.

filling in between the mass production capability of the transfer line and the slower NC machine without automatic tool changing. Several production lines based on groups of these machines now turn out parts for tractors and trucks at the rate of about three parts per hour.

Caterpillar Tractor, which does intermediate volume production work, owns 150 NC machine tools, all but one acquired since 1961. "But Caterpillar, like other intermediate volume production shape, is still not completely sold on NC throughout. 'When we design a new part we have a choice of making it conventionally or by numerical control. Often the conventional way is best because our parts are relatively high volume. NC is coming to the fore, but it will be a long time before all you see are N/C machines in factories such as ours (Iron Age, June 20, 1968, p.78)

(5) Other Technological Developments

US machine tool manufacturers and users lead in the development and application of many technological innovations. Moreover, according to James A. Gray, executive vice-president of the NMTBA, "technical developments are coming along faster than they were 5 or 10 years ago. (Iron Age, Oct. 3, 1968). As a result, apart from the NC machines that have been discussed, the range and application of sophisticated machine tools will increase in the future.

(a) Computer Numerical Control (CNC)

Shipments of new computer equipment in the U.S. in 1967 were \$ 5,900 million, an increase of 61.2% over the \$ 3,700 million of 1966. In 1967, 6.3% of business investment for new plant

and equipment went for computers. Ford Motor Company has 34 computers running 24 hours a day, and the total number of installed computers in the U.S. reached 40,000 in 1967 (Newsweek, August 19, 1968). Of course, so far most computers are used for such things as payrolls and accounting and other simple forms of data processing. However, computers are being applied more and more to the production process.

Thus numerically controlled machine tools are beginning to be applied in totally integrated installations operated as overall manufacturing systems; in a few cases process computers are being used for on-line operational control. There will be increasing use of computers in piece-type or discrete item production, and as a result numerically controlled machine tools will be used for larger lot production. According to a spokesman at General Electric, "the next generation of machine tool control systems will use process computers to control batteries of machine tools with the programme for each part generated and stored in a central computer or on magnetic tapes from where it will be fed into the central process computer for individual parts machining".

Computer numerical control, where computers run the machines, is thus said to be the next step for machine tools and control systems. Electric pulses straight from the computer run the machines without punched tape and tape reader, eliminating the time involved in these operations and the common problem of downtime caused by tape readers. One computer can operate several machines by time sharing, saving greatly on the hardware and software associated with each individual NC machine when operated without a computer. A major benefit of CNC is that the computer keeps track of machine loading, maintenance and quality control, and this gives managers a potential of much greater and more immediate control over production rather than leaving it to the shop floor. Other advantages of such systems are lower time lost in maintenance, faster machine loading, and better work scheduling. Moreover, a user with computer controlled NC can use the same computer to do accounting work or part programming directly by typing in coordinates from blueprint data.

According to an Iron Age editorial (Aug. 15, 1968, p.26; see also Sept. 19, 1968, p.38), by 1975 computers may control one third to one half of all NC machine tools, and by then NC machines will account for about \$ 1.4 billion in sales per year. In many cases the cost of a CNC system will be several million dollars. In 1968 several machine tool

builders, control manufacturers, and computer manufacturers had direct numerical control systems in various stages of development. A few units are already in operation; an Iron Age survey in mid-1968 indicated there were about 25 NC machines under direct computer control, with additional ones in experimental use, and Iron Age predicted that a year later there would be 100.

Because of the computer, even mass production lines can reap the benefits of NC. CNC transfer lines for machining are already off the drawing board. They will do runs of 500 to 1,000 pieces which are usually done on conventional machine tools and transfer lines with large amounts of special tooling. One benefit will be ability to produce a large variety of parts, each in medium lots, on a mass production basis. Thus, two production situations where CNC will be used are medium lot production of a family of related parts and high volume production of individual parts. Now CNC is used in the same situations as NC, i.e. low production volume of a large variety of parts.

The targets are large auto and aircraft firms and also small to medium job shops.

In 1968 a Detroit - based auto manufacturer placed the first order for a Sunstrand Machine Tool direct computer controlled NC system, which will include a control system which takes commands directly from an IBM 360 computer and controls the operation of four machining centers. It was reported that an aircraft company and an industrial firm were about to place a similar order (Iron Age, Aug 8, 1968, p.28)

CNC is possible for the small shop using a small general purpose computers with relatively small machine tools. NC tape serves as a storage medium for the small computers' limited memory, but the computer controls the process and collects data for management control. Complete systems, beginning with one selling for \$ 55,000 and including machine tool, computer, and controller, are already being marketed by Strippit. A computer can operate one to three Strippit punch presses simultaneously. By Sept. 1968 Strippit had already sold at least 20 punch presses equipped with computer control. (Iron Age, Sept. 19, 1968). Not only large shops but small ones will be users. (Iron Age, Aug. 1, 1968, p.26) Houseman Industries, a 26-man metal stamping job-shop near Minneapolis with turnover of \$ 500,000 per year recently bought a Strippit computer control system including a \$ 55,000 30-ton two-axis NC punch press and

a small (4K) general purpose digital computer. They have found that this system is economical for runs as low as 2 pieces. (Iron Age, Aug. 29 and Sept. 19, 1968).

(b) Parts programming and other computer aids

Many companies now prepare their control tapes using manual desk calculators, (e.g. to compute all coordinates), and manually operated tape punching devices. Some now use a computer, which accepts card inputs or parts description data, converts this to machine instructions, produces a self-checking control tape, and generates a plot of the blank layout on an incremental plotter. For one company, use of a computer reduces programming time by two-thirds compared to a manual system. (Iron Age, June 27, 1968, p.71). There is a trend toward use of such computer assists.

Control and computer manufacturers are investing heavily in the hardware and software systems that will control the NC machines in the future. Systems for NC time sharing are getting special emphasis. Westinghouse introduced a time sharing system where a low cost terminal gives manufacturers access to a large, remote computer for two-axis point-to-point programming. A job on a sheet metal punching die that took two full man days to programme for NC using manual part programming methods took five minutes to programme with a time sharing terminal. (Iron Age, June 13, 1968, p. 26). General Electric offers a Time Sharing Service which allows a parts programmer to translate a blueprint into a control tape by supplying data to a Ge computer through a terminal in the user firm. In a few minutes the terminal punches out a coded tape plus print out of the computations. This is now available for 2 - and 3-axis, point-to-point programming (Iron Age, August 1, 1968, p. 65).

(c) Shorter run application of automated machine tools

While advances in computer technology expand the economical range of numerically controlled machine equipment toward mass production, other technological advances are increasing the application of automated machine tools to shorter run production. For example, shorter set-up times due to design changes and increased acceptance of pre-set tooling mean increased applicability of automated machine tools to shorter run production.

(d) Multi-purpose machine tools

There is increased use of multi-purpose combination machine tools which are more versatile than older models. For example, there is increasing use of multi-purpose machines which do

milling, drilling and boring, including machining centers with automatic tool changers, numerical control, and indexable tables that can position the workpiece for machining on several sides. As a result, instead of moving a part from one machine to another to have various operations performed on it, an entire job may be done on one machine without removing the workpiece from the fixture.

(e) New metal removing process

There are several new metal removing processes, such as electro-chemical machining and electrical discharge machining. In some cases these can do jobs that cannot be done by conventional machine tools, or they do jobs more efficiently, as in the case of machining space age metals and complex cavities. Also, some chip removing machines (e.g. gear shaving, gear hobbing, and blank and turning machines) are being replaced (e.g. in gear making) by new metalforming processes like cold forming (e.g. rough and finish roll-forming machines), which can produce at lower cost in mass production jobs, (Iron Age, August 15, 1968, p.88).

(f) Adaptive control

There are manufacturers developing systems for adaptive control, a system that senses what is taking place at the point of work (e.g. tool wear rate, metal removal rate, finish, accuracy, chatter, etc) and adapts the machining parameters (e.g. speed, feed, etc) to suit the conditions. Adaptive control is useful where important conditions cannot be predicted closely enough to be taken care of by preprogrammed control.

In 1968 Cincinnati Milling Machine Co., offered the first commercially available adaptive control unit, the Acramizer, on an NC, single spindle, vertical profiler. It was announced that single and multi-spindle three axis profilers with adaptive control would be available beginning in September 1968. Cutter torque and deflection are monitored by electrical sensors in the spindle and fed back to the adaptive control unit, which adapts the feed and speed to maintain optimum cutting conditions, i.e. chip load per tooth, and thus reduce machining time. When displayed, the adaptive control machine cut a part in 50% of the time required for the best conventional NC cutting tool, even after the conventional NC tape had been optimised. And tool life between sharpenings increased by one-third. (Iron Age, May 30, 1968, p.27).

One of the most important problems delaying adaptive control is the development of suitable sensors. Another is identifying the true indices of optimal performance and defining them mathematically.

2. U.S. Production of Machine Tools

2.1 Products and Firms

Although the U.S. traditionally imports certain types of special high precision machine tools from Europe because comparable machines are not produced domestically, virtually the full range of machine tools is produced in the U.S., and the U.S. is a leader in advanced designs. Consequently, in the U.S. market, Indian machine tools would compete with new U.S.-made machines as well as imports from other sources and used machines.

Appendix 7 shows the total annual shipments from U.S. machine tool manufacturers for 1956-1967, broken down into metal-cutting and metal-forming types. From a level of \$ 1,377 million in 1956, shipments fell to a low of \$ 591 million in the recession of 1958. Since then shipments have risen every year and reached a level of \$ 1,807 million in 1967¹.

Table 14 gives an annual breakdown of the value of U.S. machine tool shipments by broad category for 1956-1967. Appendix 9 presents a detailed annual breakdown by type for 1964-1967, in terms of both units and value. Table 10 above gives a breakdown of shipments of numerically controlled and automatic machine tools for 1954-66.

¹ These figures are based on NMMA data. Commerce Department estimates are somewhat higher. See Appendix 8 for comparison.

Appendix 10 gives the maximum size and capacity of machines generally manufactured in the U.S.A.

The U.S. is recognized as a leading producer of numerically controlled machine tools and more advanced applications of the computer to machine tools. It is also a leading producer of equipment for mass production applications, notably automobile transfer lines. The U.S. has achieved prominence in these two fields because of the large domestic demand for such equipment by users such as the aircraft and the motor vehicle industry respectively.

Some of the special features of U.S. made equipment are given in Appendix 11.

For the past three years the U.S. machine tool industry has been operating near capacity and achieved record shipments by overtime operation and through subcontracting. Consequently the aggregate production data for 1966-67 can be taken as a close approximation of the aggregate capacity of the machine tool industry at that time. Machine tool companies in 1967 were operating first shifts an average of 50.1 hours a week, second shifts an average of 49.1 hours, and third shifts an average of 45.6 hours.²

When the flow of new orders began to accelerate in 1965 (See Appendix 7), many machine tool builders turned to sub-contracting parts and components to increase capacity.

² U.S. Department of Commerce, Business and Defence Services Administration, Industrial Outlook, 1968

In explaining its inability to expand shipments even further, the machine tool industry has said it faces two bottlenecks: shortages of skilled manpower and, to a lesser degree (but a problem in 1966), shortages of some parts, components, and accessory equipment. Shortages of skilled labour (e.g. machine operators, assemblers, inspectors, and others) have limited machine tool manufacturer's ability to schedule full second and third shifts. This shortage has resulted from rapid expansion of machine tool production and production of other metalworking industries which compete for the same skilled labour. Also, the military draft has reduced somewhat the ranks of younger semi-skilled employees.

The cost of labour has been rising, especially in the higher skill categories, with new contracts, overtime payments, and two and three shift operating schedules. Average hourly earnings of production workers in the metalworking machinery and equipment industry were \$ 3.31 in 1966, compared to \$ 2.74 in 1960³.

The high cost of labour has had several consequences for the U.S. machine tool industry: (1) Prices are higher than international levels for nearly equivalent machine tools (2) The U.S. price disadvantage is greatest in highly precise conventionally controlled machine tools and simple general purpose machine tools;

³ U.S. Department of Commerce, Bureau of the Census, Statistical abstract of the United States, 1967.

consequently the former have long been imported and recently manufacturers that once enjoyed an international reputation for the latter have been shifting production to more sophisticated machine tools where the U.S. cost disadvantage is lower. Thus, "the 1968 Astme Tool Show left no doubt about the new pattern in machine tool markets: U.S. builders are cutting back on efforts to develop new conventional models and are concentrating heavily on the production of N/C machine tools. A relatively small industry, U.S. machine tool builders - except the very largest - can't develop new technology for conventional machines as well as exploit the potential of N/C". (Iron Age, May, 1968). (3) A number of well-known U.S. machine tool manufacturers have invested in Europe or licensed European builders to produce machine tools to U.S. designs, generally to replace exports but sometimes for sale back to the U.S. as well.

The machine tool industry depends on subcontractors for certain parts and components. This is particularly true in periods of high demand when the capacity of the machine tool industry is strained, as in 1966. For example, Warner and Swasey normally has sub-contracting work amounting to twice its in-house costs, and in early 1967 this increased to three times. One problem is that subcontractors are not generally geared to produce to the accuracies required in the machine tool industry, so the availability of subcontractors producing high quality parts is limited.

The machine tool manufacturers are also dependent on supplies of standard components for the completion of each machine. Items generally purchased from special manufacturers include electric motors and controls; precision taper, roller, and ball bearings; precision ball leadscrews and nuts; hardened steel bedways; chucks; numerical control systems; and tools and accessories. In 1966 there were temporary production bottlenecks caused by shortages of several materials (copper, brass, bronze) and components, but since then there has been no problem. However, in 1967 costs rose because of higher prices for materials, components (including castings, forgings, and bearings), and sub-contract machining.

Even operating near full capacity, the U.S. machine tool industry was unable to raise production to the level of new orders during 1965 and 1966 and consequently from order backlogs for metal-cutting machine tools of \$ 343-408 million in 1961 and \$ 506-675 million in 1964, the backlog reached a peak of \$ 1,322 million in November 1966. Consequently, average delivery periods for metal-cutting machine tools increased from 4.6 months at the end of 1961 and 6.3 months at the end of 1964 to 11.1 months in November 1966. Because of its dependence on the automobile industry which expanded greatly in 1964-65, the level of new orders for metal-forming tools and the lag between orders and shipments peaked earlier, but the average delivery period was still 10.2 months in February 1966.

However, during 1967 new orders fell below the record levels of 1966 and below the production capacity of the industry, and hence backlogs and delivery periods were reduced. By December 1967, the order backlog was reduced to \$ 1,086 million for metal-cutting machine tools and \$ 230 million for metalforming machine tools, and average delivery periods were 8.5 and 4.8 months respectively. It must be remembered that within the average delivery periods are large differences for different types of machines. Smaller, conventional machine tools have a delivery period of something like half the average while some larger, more sophisticated, and custom-built machine tools have delivery periods of 2-3 years.

Appendix 12 shows the number of plants and employment engaged in the production of metal-cutting and metal-forming machine tools, broken down by size of plant and type of tool. Appendices 13 and 14 show the number of plants and employment engaged in the production of metal-cutting and metal-forming machine tools, broken down by size of plant and stage.

Appendix 13 and Appendix 14 show that in 1967 there were 259 plants with 20 or more employees producing metal-cutting machine tools and 160 engaged in the production of metal-forming tools.¹

¹ The estimate given is based on Iron Age Metalworking Marketguide. According to Steel's 1966 Census there were 292 firms with 20 or more employees producing metal-cutting machine tools and 137 producing metal-forming types.

Of these, 39 of the plants producing metal-cutting machine tools and 17 producing metal-forming machine tools had 500 or more employees, and the average employment is 348 and 180 respectively. In addition to these plants with 20 or more employees, there were 136 plants making metal-cutting machine tools and 140 plants making metal-forming machine tools.

According to the U.S. Department of Commerce, there are about 400 machine tool companies in the U.S. Thus the average value of annual shipments from machine tool firms with 20 or more employees in the U.S. is \$ 4-5 million. However, the largest single company, The Cincinnati Milling Machine Company, alone accounts for about \$ 150 million.

A total of 236 firms, accounting for about 75% of total machine tool production, are members of the National Machine Tool Builders Association. Most firms are specialized in the production of a few basic types of machine tools.

The most noteworthy fact about the geographical distribution of machine tool production is that it is even more concentrated in the Northeast industrial belt than is metalworking production as a whole. The eleven contiguous states listed in Table 15 have 95 percent of the total employment in metalcutting machine tool production in plants with 20 or more employees. One state, Ohio, has 23 percent of the employment. Only three percent of

Table 15

Employment in Machine Tool Production in the
U.S. Industrial Belt, 1967

<u>State</u>	<u>METAL-CUTTING</u>		<u>METAL-FORMING</u>	
	<u>Total em- ployment in Plants employing 20 or more</u>	<u>Percentage of all em- ployment in plants with 20 or more em- ployees.</u>	<u>Total em- ployment in Plants employing 20 or more</u>	<u>Percentage of all em- ployment in plants with 20 ore more em- ployees.</u>
1. Massachusetts	8,707	10.8	237	0.8
2. Rhode Island	4,402	5.5	-	-
3. Connecticut	7,755	9.6	1,033	3.6
4. New York	5,047	6.3	2,486	8.6
5. Vermont	4,021	5.0	125	0.4
6. Pennsylvania	1,840	2.3	2,220	7.7
7. Ohio	18,854	23.5-	7,031	24.3
8. Michigan	8,631	10.7	2,494	8.6
9. Indiana	2,150	2.7	549	1.9
10. Illinois	7,685	9.6	7,398	25.6
11. Wisconsin	6,875	8.6	282	1.0
Total of Eleven states	76,167	94.8	23,855	82.7
Total of all 50 states	80,315	100.0%	28,857	100.0%

NOTE : The list of states here is the same as that in
Table 5.6 except that Vermont replaces New Jersey.

SOURCE : Appendix 13 and Appendix 14.

the employment in metalcutting machine tool production is located west of the Mississippi River. Employment in metal-forming machine tool production is slightly less concentrated in the same eleven states, with 83% there. Moreover two states, Illinois and Ohio, have 50 percent of the employment.

2.2 Machine Tool Manufacturing Practice:

The machine tools produced in the U.S. are characterised by rugged building-block construction.

Machine tools are manufactured in a wide range of sizes, and machines are built to the customer's requirements from standardised components.

To reduce costs, plug boards, dial controls, paper or magnetic tape, computer-controlled job and material planning are being increasingly used. Facilities such as tool offset, cutter radius compensation, datum shift and inch metric conversions are incorporated in low-cost point-to-point systems, and there is contouring with circular arc interpolation to reduce idle time in programme setting. Pre-wired cartridges which can be replaced by the lesser skilled machine operator are used, thus reducing idle time and the time of a programme engineer otherwise required in setting up the machine with every change of job. The new cartridges use printed board circuit techniques, miniaturised components, and

transistors to reduce the size of the electronic control units, thus saving shop floor space.

N/C machine tools are built differently, though the basic castings may be similar to the standard non-N/C machines manufactured by the same company. Machine tools built for N/C work are specially designed with higher precision ball threads on reversing lead screws, motorised movements for tool indexing, and feed and withdrawal. However, a few machines are being built for which the user may purchase and incorporate N/C units, and N/C positioning tables and rotary indexing tables may be purchased complete with motor coupling kits and control cabinets and fitted to standard non-N/C machine tools. Numerical control cabinets are mostly purchased from specialised manufacturers such as GEC, Bendix, Slo Syn, and Westinghouse.

Almost all manufacturers visited purchase castings and forgings from outside sources, as is the West European practice. Other bought-in items include bearings, electrical and hydraulic drill, and N/C control units. However, American machine tool builders prefer to manufacture components such as lead screws and gears in their own factories to ensure quality, whereas it is common among West European builders to buy as many components as possible from outside. The advantages claimed by the West Europeans are lower capital block of plant and machinery, lower inventory, and better

and more economic supplies from established specialist manufacturers.

However, there is sub-contracting of work, and some machine tool builders even try to import sub-assemblies from their subsidiary factories abroad.

Bought-in castings were invariably fettled finished by shot blasting on receipt at the machine tool builder's factory. Minor defects such as non-critical blow holes are filled in and the castings painted before machining.

Guideways varied according to machines and manufacturers. Three types were noticed: (a) guideways cast integral with the main body, machine finished and sometimes engine finished by handscraping to improve oil retention; (b) guideway inserts - rectangular strips of pearlitic steel, heat treated and grind finished - bolted to the main body castings and (c) plastic sideways - rectangular strips of low friction material glued to the machine bedway and then ground finished. Rolling guides were noticed in low speed application, and hydrostatic fluid slide bearings in high speed planers and grinders.

Lead screws in better plants were cut by single point tools on precision long thread cutting lathes. In a few plants thread mills were used for rough first out, and finishing was

done by single point tool cutting. Ball screw threads are being increasingly used, especially for N/C machines.

Modern types of imported gear cutting machines including gear tooth profile grinders were seen, such as Maag, Fellows, Pfauter, and Gleason.

Heat treatment is undertaken by the shops themselves or executed by outside specialist sources. Cryogenic or sub-zero treatment equipment was noticed but the management was reluctant to reveal the nature of components requiring such stabilising treatment. Some manufacturers did not heat treat gears or other parts unless specifically asked to do so by the customer.

A noteworthy feature of most factories was the neat layout of buildings and efficient shop layout inside the buildings. An environment of high efficiency was prevalent - smooth material flow, easier supervision by grouping of similar type machines, progressive assembly lines, and good house-keeping, i.e. cleanliness and proper storing of semi-finished and finished parts.

To reduce costs firms do work studies, and in the better factories, extensive use of computers, punched cards and tapes is made for job analysis, scheduling machines, and material and tool planning. A striking example of time saving is the issue of punched cards for tool storage. The store_keeper fed the card to his machine

and the necessary tools were drawn automatically with the help of electrically driven pallet trucks from different levels of the tool store. The pallet with the tools neatly stacked on it with the job card reference number is then sent to the machine tool operator and reaches him before he starts on the particular job. In other factories, while the tool drawing is not mechanised, the required tools are supplied to the machine tool operator and kept mounted on a board within his easy reach and in proper cyclic order. (In India, much time is lost by the machine tool operator going back and forth to the stores, and in many cases, despite his lack of engineering knowledge of feeds and speeds the machine tool operator makes his own selection of machine tools.)

At most manufacturers, inspection was carried out by the machine operators themselves, who are provided with 'GO' and 'NO GO' gauges. At others, stage inspection was by patrol inspectors belonging to the Central Inspection Department. At some factories, it was further noticed that apart from stage inspection, some of the components were transferred to a separate room for 100% inspection.

It was not uncommon to see selective assembly of parts from batches in which some parts were outside the specified limits of accuracy. However, these were necessarily limited to those parts which require replacement rarely.

Many manufacturers have developed their own standards, which are more stringent than the minima laid down in the Government or their Associations' published standards, or by Dr. Schlesinger. Dr. Schlesinger's standards are widely regarded as out-dated.

Manufacturing practice thus gives long life to the precision of machine tools. Most machine tool manufacturers guarantee their products for one year.

A great deal of care is taken in the manufacture and assembly of numerically controlled machine tools. The critical sub-assemblies (such as the spindle and bearing assembly) and the machine tools are assembled by one manufacturer in a controlled atmosphere (68°F and humidity at 50%). The machines are assembled on separate independent floating foundations, run off and checked. The pitch, jaw and roll of the cross slide and carriage are checked with the help of optical instruments. The accuracy and repeatability of positioning to tape command is checked optically and electronically to ± 5 millionths of an inch.

2.3 Productivity and Cost Structure.

The machines installed in the factories of U.S. machine tool manufacturers are of high grade and accuracy, and include many well known indigenous and imported brands. Average age of machine tools in firms like Warner and Swasey and R.K. LeBlond Machine Tools Co.

was 10 years. Factories are continually improving their shop layout for better material flow, improving their production methods, and replacing machine tools with more modern ones which give higher production.

New standard machining units, bases, columns, and index tables have been created. Simplified systems for dimensioning drawings for heads on matching units have cut drawing time requirements. And rationalisation of designs of components have eliminated repetitious engineering drawing.

The small number of workers on the shop floor, workers operating 2 to 3 machines at a time, and use of highly automated machines clearly indicate the higher value added per worker in the U.S. compared to India.

Manufacturers were reluctant to reveal the cost of manufacturing machine tools. However, a few indications of labour costs were received as follows:

R.K. LeBlond Machine Tool Company

<u>Production/month</u>	...	400 lathes plus miscellaneous machine tools.
<u>No. of personnel</u>		
Engineers	...	25
Draftsmen & misc.	...	25
Direct	...	800
Indirect	...	400
<u>Manhours/Machine</u>		
Machining : Assembly	...	3 : 1

Warner & Swasey

<u>Production/month</u>	...	120 automatic turrets plus miscellaneous machine tools
<u>No. of personnel</u>		
Engineers	)	...
Draftsman & misc.	)	130 indus. engg. & misc.
Direct	...	1,600
Indirect	...	540
<u>Manhours/Machine</u>		
Machining : Assembly	...	1 : 1 (187 hours)

Burgmaster

<u>Production/month</u>	...	\$ 1 million
<u>No. of personnel</u>	...	500

2.4 Price of Metalworking Machinery

Table 16 shows that there has been a strong upward trend in prices of machinery, particularly metalworking machinery. For metalworking machinery, prices increased by 9.0% during the two year period January 1966 to January 1968.

Table 16

Prices of machinery

Price Indexes (1957-59 = 100)

<u>Year</u>	<u>All Machinery and Motive products, wholesale</u>	<u>Metalworking machinery wholesale</u>
1961	102.8	106.3
1962	102.9	108.1
1963	103.1	108.5
1964	103.8	110.5
1965	105.0	113.6
1966	108.2	118.8
1967	111.8	123.8
1968 (March)	114.3	127.3

Source : US Department of Labor, Bureau of Labor Statistics contained in The Handbook of Basic Economic Statistics, Economic Statistics Bureau, Washington D.C., May 1968.

This upward trend is expected to continue, with another increase of 4-5% in 1968.

2.5 Research and Development

All the manufacturers have well developed drawing if not design offices. Developments in the machine tool industry were regularly studied, prototypes made, and information fed back into production lines. Firms manufacturing specialised equipment, transfer lines and unique machines such as 'machining centres' naturally had much more elaborate drawing and design offices, as well as engineering development programmes.

The size of drawing and design office varied. For instance, the client or prospective user of a specialised machine tool and transfer line would give to the machine tool builder a sample of the finished product and production rate required (number per unit time). The machine tool builder would then prepare preliminary designs and submit these with his quotations to the client. On placement of order, the builder would prepare manufacturing drawings. Discussions would then take place between manufacturer and buyer, but the former is fully responsible for the required machine performance and specification of the finished product.

The survey team was not allowed access to R & D Departments as most machine tool manufacturers were engaged one way or the other in defence work development.

Some firms like Cincinnati Milling Machine Co. carry out intensive pure and applied research on machine tools.

Research is also carried out in universities such as Illinois Institute of Technology, Chicago (tool cutting problems). Industries encourage research in such institutes by giving them grants to tackle specific problems, and machine tool builders co-operate closely in research work with universities and industrial companies. For example, Snyder Corporation co-operated with US Steel Corporation and the University of Cincinnati in a study of cast iron and welded steel machine tool bases.

Product development was another important function of the R&D Department. After proper designs have been developed and drawings prepared, prototypes are manufactured, tested and defects removed. In better factories, such activity was carried out distinct from manufacturing and preferably in a different section solely under the control of the Development Department.

The role of new designs as indicated by the fact that 48% of the 1967 sales volume of one prominent machine tool manufacturer consisted of products not on its line five years before.

2.6 National Machine Tool Builders' Association (NMTBA)

Machine tool manufacturers are organized in the National Machine Tool Builders' Association. The NMTBA is a trade association representing 236 U.S. machine tool manufacturing companies, and its members account for approximately 75 % of U.S. machine tool production. The NMTBA seeks to promote the interests of U.S. machine tool producers by collecting statistics and other information on machine tool production, trade and trade barriers, by sponsoring an exhibition of machine tools by the members every 2 years, and by lobbying in the government.

3. Imports of Machine Tools in the U.S.

3.1 Description of Recent Increase in Imports, 1964-67

Machine tool imports into the U.S. increased very rapidly beginning in 1965, each year breaking the record of the previous year and by 1967 nearly equalling the level of machine tool exports from the U.S. This is clearly demonstrated in the following table:

Table 17
Imports of Machine Tools in the U.S., 1964-1967

<u>Year</u>	<u>Units</u>	<u>Value</u> \$ million	<u>Percentage</u> increase in value of imports over previous year
1964	24,298	36.4	-
1965	32,152	56.3	55
1966	61,679	117.7	110
1967	64,710	178.2	51

NOTE: Because import data is at FOB prices, the value of imports is understated by the cost of freight and insurance, perhaps 5 - 10 percent, and does not include selling costs in the U.S. This results in the understatement of the relative share of imports in the discussion below.

Source: Bureau of Census, U.S. Department of Commerce, Report FT 135.

The countries of origin of these imports are given in Table 18 in the next page.

Table 18

Imports of Machine Tools in the U.S. by Country of Origin, 1964-67

(Value in \$ million)

<u>Country of Origin</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1967 oncrease over 1964 (percentage)</u>
West Germany	12.6	19.4	35.3	50.6	301.6
UK	6.1	7.8	17.2	32.9	439.3
Japan	2.0	4.8	17.3	26.2	1,210.0
Italy	2.1	5.2	11.8	22.3	961.9
Switzerland	7.2	8.9	15.0	15.5	115.3
All others	6.4	10.2	21.1	30.7	379.6
Total	<u>36.4</u>	<u>56.3</u>	<u>117.7</u>	<u>178.2</u>	<u>389.6</u>

Source: Bureau of Census, U.S. Department of Commerce, Report FT 135.

The above table shows the concentration of supply of U.S. imports, with five countries supplying over 80% in all the years 1964-67. It also shows that while all the supplying countries of West Germany, UK, Japan, Italy and Switzerland shared in the expansion of imports, Japan (with only \$ 0.34 million of machine tool exports to the U.S. in 1961) and Italy increased their shares significantly.

During this period, imports increased much more rapidly than total purchases of machine tools, increasing from 3.6% of the value of domestic consumption in 1964 to 9.9% in 1967.

Within machine tools, imports have been more successful in metal cutting than in metal forming tools. In 1967, imported metal cutting tools of \$ 153.5 million accounted for 11.4 percent of domestic consumption while imports of metal forming tools of \$ 24.7 millions accounted for only 5.4 percent of domestic consumption. While exports of machine tools as a whole still exceeded

Table 19

Value of Imports as a Percentage of Total Machine Tool Purchases
in the U.S., 1964-67

<u>Year</u>	<u>Percentage</u>
1964	3.6
1965	4.3
1966	7.3
1967	9.9

Source: Bureau of the Census and Business and Defence Services Administration, U.S. Department of Commerce, Report M35W (Shipments, Exports); Bureau of the Census, U.S. Department of Commerce, Report FT 135 (Imports).

imports slightly in 1967, for metal cutting types imports exceeded exports for the first time in 1967. For particular categories of metal cutting machine tools, imports are an even higher percentage of domestic consumption, and for lathes and milling machines the U.S. became a net importer already in 1966. In 1967, imports of boring machines including vertical turret lathes accounted for 15.7% of domestic consumption by value; lathes, 13.3%; and milling machines, 12.6%.

Appendix 15 gives a breakdown of imports by types of tool and country of origin. Appendix 16 gives the imports by country of origin and type of tool for Italy, Japan, Switzerland, UK, and West Germany. The tables give number, value and average value of imports.

Table 20

Value of U.S. Machine Tool Imports as a Percentage of
Consumption, by Types, 1964-67

Type of Machine Tool	Year			
	1964	1965	1966	1967
All Metal-cutting	4.2	5.1	8.9	11.4
Gear Cutting and Hobbing Machines	4.6	8.1	5.6	9.5
Drilling Machines	2.5	3.0	5.2	6.6
Milling Machines	2.9	4.3	8.3	12.6
Boring machines, including vertical turret lathes	5.6	6.5	10.8	15.7
Lathes (except vertical turret lathes)	5.1	6.3	12.4	13.3
Grinding Machines	3.6	3.6	6.0	7.1
Other metal-cutting	4.6	5.2	8.6	11.4
All Metal-forming	2.0	2.3	3.0	5.4

Source: Bureau of the Census and Business and Defence Services Administration, U.S. Department of Commerce, Report M35W (Shipment, Exports); Bureau of the Census, U.S. Department of Commerce, Report FT135 (Imports).

Moreover, since imports are concentrated in the smaller, more conventional models of these tools, for these models imports would be an even higher percentage of domestic consumption. Statistics are not gathered in sufficient detail to demonstrate this, but it has been estimated that for standard machine tools as a whole imports account for as much as 25 percent of the value of domestic consumption, and that for categories such as small, standard engine lathes the figure is between a third and a half.

In addition, imports have a larger share of domestic consumption when figured on a unit rather than dollar basis. It has been estimated that on a unit basis 1967 imports of lathes accounted for about 30 percent of domestic consumption and imports of boring machines about 36 percent. In 1967, George C. Marakas, Sales Manager of R.K. Le Blond Machine Tool Company, said " in our field of small engine lathes, I would be willing to bet there are now more being imported than are made in the U.S." (Iron Age, July 13, 1967, p.40).

Even in 1968, imports of machine tools to the U.S. were dominated by smaller, conventional, general purpose models, including small engine lathes, light and medium duty milling machines and boring machines, grinding machines and the like. "Where do the foreign tool makers see their market opportunity? In the sale of standard conventional tools rather than the more sophisticated machining centres and highly automated gear." (Iron Age, March 21, 1968, p.75). These represented a large share of all imports, and it was in these categories that imports accounted for the largest share of domestic consumption and were causing the greatest worries among US machine tool manufacturers. While foreign manufacturers have been offering and actively promoting a limited range of sophisticated, automated, special purpose, large scale and numerically controlled machines, including machining centres, the bulk of sales are still in the standard machines.

It is instructive to note the contrast between the simple machine tools imported and the sophisticated machine tools exported from the U.S.

3.2 Explanation of Recent Increase in Imports, 1964-67

In order to predict future changes of imports into the U.S. and understand how a country may increase its exports to the U.S., it is important to examine the reasons for the radical increase in imports into the U.S. between 1964 and 1967. The reasons for this increase may be summed up as impressive marketing organisations offering lower price and faster delivery for comparable quality and service. We now examine these reasons in detail.

3.2.1 Shorter Delivery Period

The increase in military procurement for the Vietnam War and a general expansion of demand for the products of the metal working industries played an important part in the rapid expansion of imports of machine tools. The increase in demand for metalworking products produced a demand for machine tools to expand the capacity of the metalworking industries. In late 1966, 10 percent of the orders booked for machine tools were from military contractors and another 30 percent were from industries where machine tools are used for either military or military-related work. (Iron Age, November 17, 1966, p.214, and January 5, 1967, p.85). According to Gen. Frank S. Besson, Jr., Commander of the U.S. Army Material Command, the

Army alone bought nearly \$ 25 million of machine tools in 1967 and the military establishment and military supporting industries asked for and received over 50% of the annual machine tool output.

(Iron Age, May 18, 1967, P.67). Military industry purchases of metal working machinery increased by 158 percent between fiscal 1965 and fiscal 1967.

Despite three-shift operation at the limits of capacity set by available equipment and skilled manpower, order backlogs of US machine tool producers increased and leadtimes between order and delivery lengthened, particularly in the second half of 1965 and 1966.

Table 21

Order Backlog and Average Lag between Order and Shipment
for Machine Tools in the U.S., 1961 - 1967

<u>Date</u> <u>(End of Year)</u>	<u>Order</u> <u>backlog</u> \$ million	<u>Average Lag</u> <u>between order</u> <u>and shipment</u> months	<u>Metal-forming Machine Tools</u>	
			<u>Order</u> <u>backlog</u> \$ million	<u>Average Lag</u> <u>between order</u> <u>and shipment</u> months
1961	394	4.8	73	2.8
1962	354	3.9	109	4.7
1963	475	5.6	153	5.8
1964	669	6.3	374	10.9
1965	899	7.6	412	9.9
1966	1,322	11.1	440	10.2
(Peak)	(November)	(November)	(July)	(February)
1966	1,307	10.9	394	8.4
1967	1,086	8.5	230	4.8

Source: Backlog - National Machine Tool Builders' Association

Lag - U.S. Department of Commerce, Offices of Business
Economics, Business Statistics, 1967.

Some impression of the scarcity of machine tools can be gained from the fact that one machine tool manufacturer reported that users who were able to get machine tools because of their early orders could and were reselling new machines at a 10 percent markup in early 1967.

The result of this situation was that for many firms, particularly those without defense ratings which gave priority in purchase of machine tools from the U.S. manufacturers, the only way to get machine tools quickly to expand production was to buy imported machines.

During 1965-1967, foreign machine tool makers were able to supply machines with much shorter delivery periods than U.S. producers, and they made this an important selling point. In particular, a recession in investment in Japan and Italy in 1965 and in West Germany, Britain and France in 1966 and 1967 left machine tool producers in those countries with reduced domestic markets and excess capacity available for production of machines for export, and hence they could offer prompt delivery to U.S. buyers. They not only could ship promptly when an order was booked but built many smaller standard machine tools for stocking in the U.S., so that delivery was immediate. The delivery period of comparable machine tools from U.S. manufacturers was 4-5 months even in mid-1967 and an absolute minimum of 3-4 months in the beginning of 1967 (Iron Age, January 5, 1967).

In few cases airfreight has been used, but this is relatively insignificant and presumably generally paid for by the buyer desperate

to get a machine (see Appendix A3). However, one distributor of foreign machines said in 1968 that "we're shipping machines by air any time we think it'll give us a foot in the market door". (Iron Age, March 21, 1968).

However, this delivery advantage of foreign producers has been reduced since the end of 1966, both because of declining new orders, order backlogs, and delivery periods in the U.S. and because of revival of domestic demand for machine tools in the countries supplying imported machine tools.

This raises the important question whether the increased market share of imports can be maintained, or even expanded, without the advantage of a much shorter delivery period. On the basis of the other factors which led to the expansion of imports in 1965-1967, and the 50% tariff reduction as a result of the Kennedy Round, one can predict that barring an increase in import barriers, the countries which have succeeded in exporting to the U.S. in recent years will maintain & probably increase their share of the market. We now turn to a consideration of these other factors which explain the expansion of imports.

3.2.2 Lower Price

In many cases, the machine tools imported into the U.S. in recent years have had a very substantial price advantage over machine tools produced in the U.S. even after payment of tariffs and freight.

According to the NMTBA in 1968 a wide range of foreign (specially Japanese) machine tools are available in the U.S. at price which are 20 to 50% below the prices of comparable U.S. machines.

In terms of price, the people we interviewed suggested that the U.S. selling prices of Swiss and West German machines are only slightly lower than the prices on U.S. machines, e.g. 5-7%. The distributors of these machines emphasised that lower price is not an important selling point of these machines. (Instead, they emphasised the importance of top quality, rigidity, precision, special features, and specialty machines with fast delivery and good service. Tool and die shops, which work to exacting tolerances, are important customers).

UK machine tools seem to have a somewhat greater price advantage. It is interesting that one company that manufactures an identical single spindle automatic chucking machine in the U.S. and England sells the English-built machine for \$ 30,500 and the American machine for \$ 45,900 (both prices FOB plant of manufacture).

U.S. selling prices of Japanese machine tools had a rather substantial advantage over U.S. machines, and the NMTBA says that a wide range sell at 25 to 50 per cent less than comparable U.S. machines. However, several distributors of Japanese machine tools in the U.S. emphasised that the price advantage was declining.

Italy and Spain both sell machine tools in the U.S. at prices substantially below the prices of U.S. machines.

Of course, within each country there is a wide price range. Moreover, part of a good deal of the price difference in some cases is no doubt caused by a difference in quality of the machines being compared. Furthermore, since the price of machine tools generally include a margin for actual and anticipated service costs borne by the distributor (e.g. pre-sale engineering advice, service overheads including the investment costs of stocking spares etc), it is hard to make price comparisons without knowing whether service and terms of payment for service are comparable.

Because the lowest priced machine tools in the U.S. are imported from Europe or Japan, the selling prices of the lowest priced machines available in the U.S. include the cost of freight and import duty, which together amount to something like 20 percent of the FOB price or between 10 and 15 percent of the selling price. If these machines are available for sale in Europe and Japan at the same ex-work prices at which they are available for export to the U.S. and distributors' markups are not more in Europe and Japan than in the U.S., then one could conclude that machine tool prices are lower in Europe and Japan than in the U.S. If so, it would probably be easier for India to establish a price advantage in the U.S. market than in Europe or Japan.

However, because of export subsidies and price differentiation between domestic and export sales, it is possible that the selling prices of foreign machines in the U.S. are no higher than the selling prices of these machines in the countries where they are manufactured, despite transportation and tariff charges. In fact, one large distributor of Japanese machine tools stated that sometimes in the past few years to break into the market Japanese machine tools have been sold to customers in the U.S. at lower prices than in Japan. On the other hand, it is still undoubtedly true that India is in a better position to compete on price with these manufacturers in the U.S. than in their home markets.

In Table 16 it was shown that U.S. prices of metal working machinery have had a strong upward trend, increasing at an average of 4.5% in 1966 and 1967. This upward trend is expected to continue.

A number of reasons can be suggested why the U.S. selling prices of imported machine tools is lower than the selling price of U.S. machine tools. Presumably the most important is lower labour costs.

According to NMTBA⁽¹⁾, labour costs often represent as much as 50 percent of total costs in the U.S. machine tool industry, while

NOTE: (1) The NMTBA may well have overstated its argument in an attempt to convince the U.S. Government that because of higher labour costs in the U.S., U.S. producers could not compete with foreign machine tool producers.

According to a survey made by the NMTBA early in 1968, nineteen U.S. machine tool companies reported that earnings (including fringe benefits) of comparable machine tool production workers in Western Europe, on an hourly basis, are from 28 to 58% of American workers' earnings. If there were no differences in production methods, non-labour costs, or the efficiency of workers, that would allow European manufacturers to produce machine tools at costs of 21 to 36 percent or more below U.S. costs.⁽¹⁾ In addition, the NMTBA claimed that some material inputs were more expensive in the U.S. The NMTBA therefore asserts that "generally speaking, lower material and labour costs abroad enable foreign machine tool manufacturers to quote their products at from 60 to 75% of the price of comparable domestically produced (i.e. U.S.) machine tools".⁽²⁾

Different surveys have led others to conclude that because of the greater efficiency of U.S. labour, the labour costs of producing a machine in the U.S. are not much higher than in West Germany, Britain or France. (However, it is not made clear whether this should be attributed to the superior quality of U.S. labour or to greater use of capital in the U.S. If it is the latter then, of course, one would expect non-labour costs to be a good deal higher in the U.S. than in Western Europe.

NOTES: (1) However, some argue that, because of better management and harder work by labour, output in the U.S. machine tool industry is \$ 20,000 per man per year compared to \$ 10,000 in Europe, with the same capital equipment.
(2) NMTBA, Hearings on the Future of United States Foreign Trade Policy, June 6, 1968, p.15.

Another reason that can be suggested for the lower prices of foreign machines is the reduction of price below the normal margin over costs. This may be due to subsidy of production or export in some countries.

It may also be due to price cutting when the level of demand for machine tools is depressed. For example, it was reported in 1965 that during Japan's recession Japanese machine tool manufacturers were cutting prices on machine tools sold in Japan.

Finally, it may be due to price discrimination, with the manufacturer charging a lower price and earning a lower profit on export than on domestic sales. It is very common in international trade in manufactured goods, including machine tools, for manufacturers to charge different ex-works prices on exports and domestic sales (even in the absence of subsidies on exports). According to a distributor of Japanese machine tools, U.S. selling prices of Japanese machine tools were initially set lower than the selling prices charged in Japan, despite the transportation cost, tariff, and distributor markups, in order to break into the U.S. and Canadian markets.

Price discrimination may be carried out on a long-term basis, or may be a short term strategy. Japanese machine tools have reportedly been concessionally priced to break into the market, and prices have been increased after a model has gained acceptance.

In certain cases, particularly Japanese machine tools, distributors told us that imported machine tools were losing their price advantage. In the case of Japan, this is partly because of rising labour costs, partly because Japanese manufacturers are withdrawing the price concessions on general purpose machine tools used to make an initial breakthrough in foreign markets (price concessions on sophisticated machine tools are more likely to continue).

3.2.3 Satisfactory Quality and Design

Although the U.S. has maintained its pre-eminent position in technological innovation in the machine tool industry, the increase in machine tool imports was made possible by the availability of high quality machines produced in foreign countries, although the quality level of some imports is no doubt lower than that of competing US machines. During this period Europe and Japan overcame most of the psychological barriers to imports and became well accepted as suppliers of machine tools. No one questioned in the U.S. or Canada spoke disparagingly of the quality of European or Japanese machine tools.* Many noted that quality had been greatly improved since the Korean war period, when many low quality machine tools were imported.

* Of the foreign machine tools being offered for sale in the U.S. and Canada, only Soviet machine tools seem to have a reputation for inferior quality. They are widely considered to be crude and inaccurate, and we were told of one user who returned a Soviet milling machine because of its inaccuracy.

The increased availability of quality machine tools reflects the reduction of the technological gap in the general range of production between the U.S. and the other advanced countries as the latter have gained experience and as technology has spread. Thus, up-to-date production and quality control methods are used to make machines with modern designs. Until recent years, many foreign made machine tools, designed with the local market in mind, were lighter and less automatic than the typical U.S. machine tool, and generally required a highly skilled operator in constant attendance, since quality production depended on the craftsmanship of the operator. Because of changes in their own markets brought on by higher skill costs and increased possibilities for mass production and because of deliberate designing of machine tools to suit the U.S. market (European and Japanese machine tool manufacturers depend on exports for a substantial percentage of sales), many machines produced outside the U.S. are comparable in quality and design to U.S. machines. (See Steel, Oct. 23, 1967, pp.66-67).

According to Kurt Ueko, executive vice president of Kurt Orban Company, a U.S. importer of machine tools, speaking in 1965, "until recently, the typical foreign made machine tool, designed with the local market in mind, was lighter, more universal, and less automatic than the typical American machine tool, and often required a highly skilled operator in constant attendance. Times have changed, however. Mass production has come to both Europe and the Far East,

and what local markets haven't taught, the American example has. Today, the best of the foreign machine tool manufacturers are just as able to produce American-type machinery as we are. And they have taken the trouble to study American needs" (Machinery, October 1965, p.128).

In part this is due to production in other countries by US companies or under U.S. License. The machine tool industry is becoming increasingly multi-national. For example, in 1965 \$ 0.5 million in jigmills produced in the UK by Herbert under license from the American DeVlieg Company were ordered by U.S. companies.

However, US machine tools are still noted for their greater power. Moreover, one user stated that, while US machine tool manufacturers rate power conservatively (e.g. a one horsepower machine really has a maximum output of two or more horsepower), foreign manufacturers generally give their machines the maximum power rating and the machines cannot be operated above the specified level of power.

Not only have foreign producers offered high quality conventional machines, and machines adapted to the needs of the U.S. market, but they have begun to offer an increasing range of sophisticated automatic and numerically controlled machinery. Thus, in the past two years, observers at the largest exhibition of European machine tools in Europe and at ASTIE in the U.S. have observed that European standard machines are far more advanced than even 5 years ago, and

include such refinements as hydrostatic spindles and ways, more horsepower, greater accuracy, and more pushbutton and power assists. In some cases, it is reported, European machine tools are more versatile and have a wider variety of accessories and adjustments built into them than do their US counterparts. Moreover, European machine tool manufacturers offer a large range of special, automated and numerically controlled equipment including machining centres with automatic tool changers (Steel, Oct. 23, 1967, p.66-67). Similarly, reviewers of the Japanese machine tools exhibited in the U.S. in the recent past have noted the large number of numerically controlled units demonstrated and offered for sale.

In addition to the improved quality and increased range of machines offered for sale, one reason for the import of machine tools is that comparable models are not available in the U.S., or that the foreign country has long been the recognised leader in quality and design of a certain type of machine tool. This is true of many Swiss machine tools, including jig borers and screw machines and other special purpose machines.

Furthermore, both as cause and effect of the increase in imports, US manufacturers are moving away from production of conventional tools, leaving a gap for imports: "The 1968 ASTME Tool Show left no doubt about the new pattern in machine tool markets: US Builders are cutting back on efforts to develop new conventional models and are concentrating heavily on the production of N/C

machine tools. At the same time, the Tool Show revealed that conventional units from Japan and Europe are getting better all the time. Foreign builders will make new inroads into US markets for conventional machines. And in fact, they may be filling a vital gap. For, a relatively small industry, U.S. machine tool builders - except the very largest - can't develop new technology for conventional machines as well as exploit the potential of N/C". (Iron Age, May 1968).

3.2.4 Aggressive, High Quality Marketing Organisation,
Sales Promotion and Service

The increase in imports was not however a passive response to extended US delivery periods and availability of low priced machines of suitable quality abroad. Even several years before 1965, many foreign producers began aggressive marketing campaigns to establish permanent markets in the U.S. They spent heavily on sales promotion and established sales and service networks to assure customers of service comparable to that available on US machines.

While Switzerland has long been in the US market, and some other European companies began their serious marketing efforts at the time of the Korean War, Japan started in the early 1960s. According to James Gray of the NMTBA, speaking in mid-1967, "about 7 years ago the Japan Machine Tool Trades Association made known its plan for coming into the American market for keeps". According to Masaaki Ichikawa, President of Hitachi Seiki Co Ltd, speaking in early 1968, "Japan's export drive began in earnest approximately five years ago". (Japanese Edition of the American Banker).

Until these systems were set up, tested, and proved satisfactory, the problem of service and spare parts availability was a major deterrent to U.S. acceptance of foreign-made machine tools. Satisfactory experience with quality and spare parts was important in bringing about greatly increased acceptance of foreign machine tools. Imported machine tools can now be found in most applications, with the notable exception of the automotive industry.

These sales efforts were increased in 1965-66 because of a decline in domestic demand for machine tools in the foreign producing countries and increased demand in the U.S. As additional foreign lines entered the US, they followed this pattern. This marketing effort played a major part in the recent increase in imports in the U.S., particularly in determining the relative shares of the different foreign suppliers in the increased volume of imports. Thus, the astonishing increase of Japanese imports - over 1000% between 1964 and 1967 - depended largely on the Japanese marketing effort. Moreover, the competitive situation in the U.S. is now such that no foreign machine tool manufacturer can penetrate the U.S. market without a well organised distribution, sales promotion and service system. (The marketing organisation of foreign machine tool manufacturers is described in the section on distribution of machine tools in the U.S.).

3.3 Opinions on the Future Trend of Standard
Machine Tool Imports into the U.S.

Walter J. Campbell, in an editorial in Steel (Sept 18, 1967) predicted that "when the current boom in machine tools subsides, we will find that foreign-built standard machine tools have established a firm beachhead in the U.S. In the future, many, perhaps most, of the standard tools used in this country will come from overseas. U.S. builders will have to concentrate on the more highly engineered, more sophisticated type of machines".

Similarly, George C. Marakas, Sales Manager of R.K. Le Blond Machine Tool Company, a U.S. manufacturer of machine tools, has said that "as imports of standard tools increase, we will be forced to abdicate this market and go into more sophisticated tools to get fuller utilisation out of the manpower we have. We will, thus, make fewer standards". (Iron Age, July 13, 1967, p.40).

The NMTBA has declared that the import situation points "to imminent cessation of production of certain lines of machine tools in the U.S." (Hearings on the Future of United States Foreign Trade Policy June 6, 1968).

3.4 U.S. Imports of Machine Tools in the Korean War (1951-52)

It is interesting to compare the increase in U.S. imports during the Vietnam war with that during the Korean war. U.S. imports of machine tools reached about \$ 24 million in 1952. That is three times the amount imported in 1951 and eight times the pre-Korean war figure.

The primary reason for the sharp increase in imports at that time was the faster delivery offered on foreign machine tools. Also, most foreign machine tools were available at lower prices than comparable U.S. machines, some 25 per cent lower. In addition, some machine tools imported from Europe were special types for which there was no U.S. counterpart.

The major reasons for reluctance to buy foreign tools at that time were reported to be their lesser resale value compared with U.S. tools and doubts about their quality and the adequacy of service available.

The major difference between imports recently and during the Korean war is that in the earlier period few foreign manufacturers had well organized distribution facilities in the U.S., and much of the initiative in importing came from the buyer.

U.S. aircraft builders were the chief buyers of foreign equipment. Because jet-engine output was lagging, Air Force procurement officers encouraged big prime contractors like General Electric

to scour the European market for machine tools for quick delivery. A team from G.E. toured Europe picking up some 300 machine tools and supplying them to G.E.'s subcontractors.

However, a number of foreign machine tool manufacturers did have distributors in the U.S. already, and these importers claimed that adequate spare parts were being stocked in the U.S. and that service was available. One distributor of West German machines had a policy of maintaining an inventory of parts equal to 10-15 per cent of the sale price of machines. One distributor of Swiss machines had five service engineers around the U.S. capable of rebuilding their machines; another had 16 engineers; and a third equipped machines with service kits. One distributor equipped some imported machines with U.S. motors to reduce parts problems and used air freight to get necessary spares quickly.

Most of the machine tools imported were standard tools, especially milling machines, radial drills, engine lathes, grinders etc. Large purchases were by aircraft producers and subcontractors, but small shops not doing defense work also bought foreign machine tools. Since they were not eligible for priority allocations of U.S. tools, this was the only way for these firms to get machines. The largest exporter to the U.S. was Switzerland, which supplied a number of special machines (e.g. automatic screw machines, jig borers) and which had representatives in the U.S., including American SIP

Corporation, Cosa Corporation, and Carl Hirschman Co. The other major sources of imports were West Germany (represented by Kurt Orban Co.), France, Italy (represented by S. & S. Machinery Corp.) and England (represented by Triplex Machine Tool Corporation), with a few from Belgium, Sweden and Japan. Most of these distributors were not members of the American Machine Tool Distributors' Association, and some of the most important of them began as dealers in used machine tools.

After the Korean war, there was a reaction against foreign machine tools in the U.S. because many of the machines imported during the emergency were of inferior quality or did not have adequate service.

3.5 U.S. Import Barriers to Machine Tools

3.5.1 Tariff Barriers and Border Taxes

The U.S. imposes tariffs on all machine tool imports. As a result of the Kennedy Round of tariff negotiations under the GATT, a 50% reduction in these tariffs is being implemented in five instalments between January 1, 1968 and January 1, 1972.

The U.S. does not give tariff preferences to any suppliers of machine tools, and it does not give tariff concessions on machine tools when similar machines are not produced in the U.S. Tariff rates above the MFN rates are applied to imports from certain countries

are not members of the GATT. The United States does not impose any border tax, and there is no federal excise tax applied to the sale of foreign or domestic machine tools.

Table 22

U.S. Tariffs on Machine Tool Imports

<u>Product category</u>	<u>Tariff Rate</u>	
	<u>Pre-Kennedy Round 1967</u>	<u>Post Kennedy Round 1972</u>
Metalworking machine tools for cutting or hobbing gears	20%	10%
Metalworking machine tools for boring, drilling, and milling, and vertical turret lathes	12%	6%
Other Metalworking machine tools	15%	7.5%

Source: Tariff Schedule of the United States

3.5.2 Licenses, Quotas, and Foreign Exchange Controls

The U.S. does not have any licensing requirements, quotas, or foreign exchange controls inhibiting the free importation of machine tools. The only formal restriction affecting machine tool imports is the prohibition of all imports from the Republic of China (Mainland China). There is no evidence that administrative procedures impose any "invisible" barriers to machine tool imports. There is no requirement for inspection of machines or certification of standards at a national level.

3.5.3 Buy American

The United States has a "Buy American" act which restricts purchases with Government funds to domestic sources of supply when the goods are available in the U.S. The restriction applies to purchases made by the Government, and hence applies to purchases of machine tools for military armouries and arsenals. It also applies to some extent to firms working under Government contract, to vocational schools receiving federal aid, and to purchases financed by US foreign aid. Under a defense sharing arrangement, Canadian producers qualify as suppliers under the "Buy American" Act. Since most types of machine tools are produced in the United States, the domestic origin requirement does restrict the access of importers to certain markets for machine tools in the U.S. This was confirmed by the importers we interviewed. However, a representative of the Business and Defense Services Administration of the U.S. Commerce Department insisted that the "Buy American" act does not restrict sales of imported machine tools. He claimed to have (confidential) information that Government funds are spent on imported machine tools.

3.5.4 Pressures for Further Restriction of Imports

Because of rising costs in the U.S., the success of the Kennedy Round, and the U.S. balance of payments deficit, since 1967 firms in a wide range of industries, facing competition from imports, have been applying increased pressure for additional restrictions on imports, and they have found a sympathetic audience in the U.S.

Congress. In 1967, ninety per cent of the members of the U.S. Senate supported legislation to impose quotas on certain imports. However, President Johnson threatened to veto any import quota passed by Congress.

Because of this protectionist sentiment and the U.S. balance of payments situation at this time, it is unlikely that tariffs will be reduced below the levels set by the Kennedy Round. It is also unlikely that the U.S. will grant tariff preferences to the less developed countries.

In fact, there is a danger that barriers might be increased. The NMTA has given a typical protectionist argument that in view of the increasing level of imports of machine tools into the U.S., imports should be restricted. They argue that:

- (1) The imports which are produced in countries where labour is lower priced present unfair competition for U.S. producers, and reduce their profits, although as of 1968 U.S. producers were operating at full capacity and had high profits.
- (2) The imports are forcing domestic producers to switch production away from certain lines where the U.S. does not have a comparative advantage, and it is vital for the American war and peacetime economy to have indigenous production of all types of machine tools despite the higher cost of domestic production
- (3) The imports hurt the U.S. balance of payments.

In June 1968, a spokesman for the NMTA predicted that it would be successful in getting additional restrictions on imports, including possibly quotas. The NMTA has not called for quotas

because of the complexity of administering them but has stated that "quotas may be required and the problem of administering them may have to be solved".

In February, 1968, the NMTPA requested a border tax on imports together with an export rebate scheme.

In June, 1968, the NMTPA made the following recommendations to the Administration (Trade Information Committee) and Congress (House Ways and Means Committee) concerning machine tool imports.

"We urge as a minimum that the United States make no further tariff concessions on machine tools, beyond those already agreed to in the Kennedy Round.

"We propose ... a system of selective import surcharges under which imports of specific categories of machine tools would be subjected to additional levies when imports ... exceeded 10% of domestic consumption during a prior base period (the preceding three years, but not including any years prior to 1967). The basic categories we have in mind are ... (1) metal forming machines, (2) gear cutting and hobbing machines, (3) drilling machines, (4) lathes (except vertical turret lathes), (5) grinding machines, (6) milling machines, (7) boring machines (including vertical turret lathes) and (8) other types of metal cutting machines ... Sufficiently reliable import figures are not available with respect to more refined categories ... Should such figures become available, we might well

recast our proposal to correspond to the opportunities presented by the availability of such figures ... We would propose ... a 3% ad valorem surcharge for each percentage point by which imports of the category involved exceeded 10% in cases up to 15%, and a 4% surcharge for each percentage point after that, with an absolute surcharge ceiling of 50% ad valorem ... We propose phasing out the surcharge over a 15 year period." (1)

There is an additional possibility that machine tool imports into the United States could face countervailing duties where they receive export subsidies not approved by the GATT. For the first time, in 1967 the U.S. steel industry received Government support for its contention that subsidies and tax concessions given to foreign producers by their Governments result in unfair competition. The Treasury Department imposed countervailing duties on certain steel products from Italy. The size of the countervailing duty was equal to the subsidy, which was in the form of a tax rebate. (2) Under GATT, it is permissible to rebate certain taxes on exports (those falling specifically on the product involved, such as value added taxes) but not to give general tax concessions (such as taxes on profits).

(1) NMTRA, "Hearings on the Future of United States Foreign Trade Policy ...", June 6, 1968. See also Iron Age, June 13, 1968, pp.11

(2) Iron Age, April 27, 1967, p 63.

3.6 Prejudice against Foreign Suppliers

Much of the reluctance to buy imports has been eliminated by satisfactory experience with service and spare parts on imported machine tools. Nevertheless, distributors say a foreign machine tool has to be priced lower than an equivalent U.S. tool to sell, since the users still prefer local manufacturers.

However, there is still prejudice against certain foreign suppliers. Distributors in the U.S. say it is very hard to sell a machine tool produced in the USSR or France. One attributed this largely to the fact that the machinists who have to use the machine tools do not want to work on anything produced in the USSR, because of communism, or France, because of DeGaulle's policies.

4. Used and Rebuilt Machine Tools

In addition to other suppliers of new machine tools, Indian manufacturers will have to compete with the used machine tools made available by replacement and modernisation programmes, and with the alternative of rebuilding a machine tool rather than replacing it.

The United States has a well developed network of independent distributors and rebuilders of used machinery. The used machinery dealers are organized in the Machinery Dealers National Association, and in recent years many of the dealers have taken on the distribution of new imported machine tools. In addition, the U.S. Department of

Defense has a division which sells surplus Government-owned used machine tools directly to end users. The Government sold 1,400 surplus used machine tools in 1967, and has set a voluntary limit of 6,000 tools per year, but the Government sold as many as 28,000 used tools per year after the Korean War (Iron age, May 23, 1968, p.11).

There are twelve plants with 20 or more employees each, with a total employment of 540, and 14 other plants engaged in the rebuilding of metal cutting type-machine tools. There are four plants with 20 or more employees each, with a total employment of 270, and 3 other plants engaged in the rebuilding of metal-forming type machine tools. In addition, many machine tool manufacturers also do rebuilding.

Table 23 shows the index of used machine tool sales in the U.S. from 1953 to 1967. There was an increase in the first quarter of 1968, but it was expected that 1968 sales would be below 1967.

In 1966, extended delivery terms and the high prices of new machine tools brought used machine tool dealers and machine tool rebuilders their largest volume of business since World War II and the Korean War. Simmons Machine Tool Corporation of Albany, N.Y., the biggest independent rebuilder, tripled its employment between 1964 and 1966. It did \$ 3 million of business in 1964, \$ 5 million in 1965, and much more in 1966.

Table 23

Used Machine Tool Sales in the U.S. 1958-67

(Index: 1957-59 = 100)

<u>Year</u>	<u>Index</u>
1958	90.7
1959	107.2
1960	99.4
1961	107.6
1962	121.4
1963	126.7
1964	146.1
1965	165.9
1966	202.3 (Peak: April, 1966 : 255.4)
1967	151.1

Source: Machinery Dealers National Association

According to Albert L. Rhea of Gahr Machine Rebuilding Co., Cleveland, speaking in 1966, "we will come out of this period with a net gain for the rebuilding industry. It was well established before, but now a lot of people who wouldn't do it are impressed with the opportunities for savings and increased production." (Iron Age, August 18, 1966, pp. 30-31).

Rebuilding is done both by independent rebuilders and by many machine tool manufacturers, (e.g. New Britain Machine Co., Warner and Swasey Co., Standard Machine Tool Co. in Canada), some of whom do rebuilding in their regular production plant and some of whom have rebuilding at a separate plant, and some of whom rebuild machines other than their own make. Some rebuilding is done on order for the customer who owns the machine. In other cases, the rebuilder buys used machinery, rebuilds it, and sells it. Some users were having tools rebuilt in 1965-66 because they could not wait for new tools with their long delivery periods; for others, the difference in cost between rebuilding a machine and replacing it was the basic consideration.

The following statement of rebuilding potential is given by Pope Machinery Corp. Rebuilding Division:

"Pope can rebuild your machines to original accuracy. Rebuilding can frequently improve productivity beyond the original capacity of the machine. Upon receipt of your machine at our plant it will be inspected to determine its present condition. It will then be completely dismantled. All parts found to be defective will be reworked or replaced with new parts. All sliding and wearing surfaces which require regrinding or rescraping will be reground and/or rescraped. All anti-friction bearings will be replaced regardless of their condition in order to assure the accurate rotation of all revolving parts. All friction type or "plain" bearings will

be reworked or replaced to restore their original accurate alignment. Hydraulic systems, if any on your machine, will be completely overhauled. Where required, new parts will be installed. All wiring and electrical components will be inspected for wear and defects and replaced when necessary. Motors and pulleys requiring precision dynamic balancing will be balanced. After the completion of the above-mentioned work, your machine will be completely reassembled and aligned using the latest mechanical and optical electronic measuring equipment to insure the precision alignment of all working parts. The machine will then be prepared and painted to the colour of your choice so that you not only have 'new machine' performance but a new looking machine as well."

From this description, one thing that is evident is that machine tool rebuilding is extremely labour intensive. As a result it would be expensive in North America, and hence it should still be possible for a new imported machine tool to compete.

However, it is important for the Indian machine tool industry to recognize that there is strong competition not only from new Japanese and Italian machines but also from used machinery in the U.S. market for general purpose machine tools. Because many Indian designs, whether acquired by collaboration or by modification of foreign designs by Indian companies, are 10 - 20 years old in all their basic features, these Indian machines have no technical advantage over many reconditioned used machines.

To give a specific example of the competition, in a recent sale of an HMT machine in California, the final choice in the buyer's mind was between the HMT and a used machine. "Bowers (division of Norris Industries, Inc, Los Angeles) shopped around before buying the HMT (radial) drill, and Buck Jakob, purchasing agent, said the company had considered a used Cincinnati machine. 'Put it was 12 years old, and didn't have a warranty, Mr Wilhelm said, adding that the old machine sold for \$ 8,000 and the new Indian drill for \$ 8,300 with a tilting table." (Metalworking News, November 18, 1968).

According to the Tenth American Machinist Inventory, only 30% of the equipment installed in metalworking plants at the end of World War II is still there; the rest has entered the used market and been sold to maintenance shops in other industries or to training schools, been exported, or been scrapped

It is reported that used machine tools which have not been reconditioned are often sold basically on a weight basis.

5. Marketing of Machine Tools in the U.S.

5.1 Central Marketing Organisation of U.S. Manufacturers

The marketing organisations of U.S. machine tool manufacturers are mostly "functional" and usually structured according to the diagram in Table 24. There is, however, an element of "customer group" structure in the marketing organisations of the large manufacturers. For example, Warner and Swasey has a full-time salesman attached to Caterpillar Tractor Co., a very large customer.

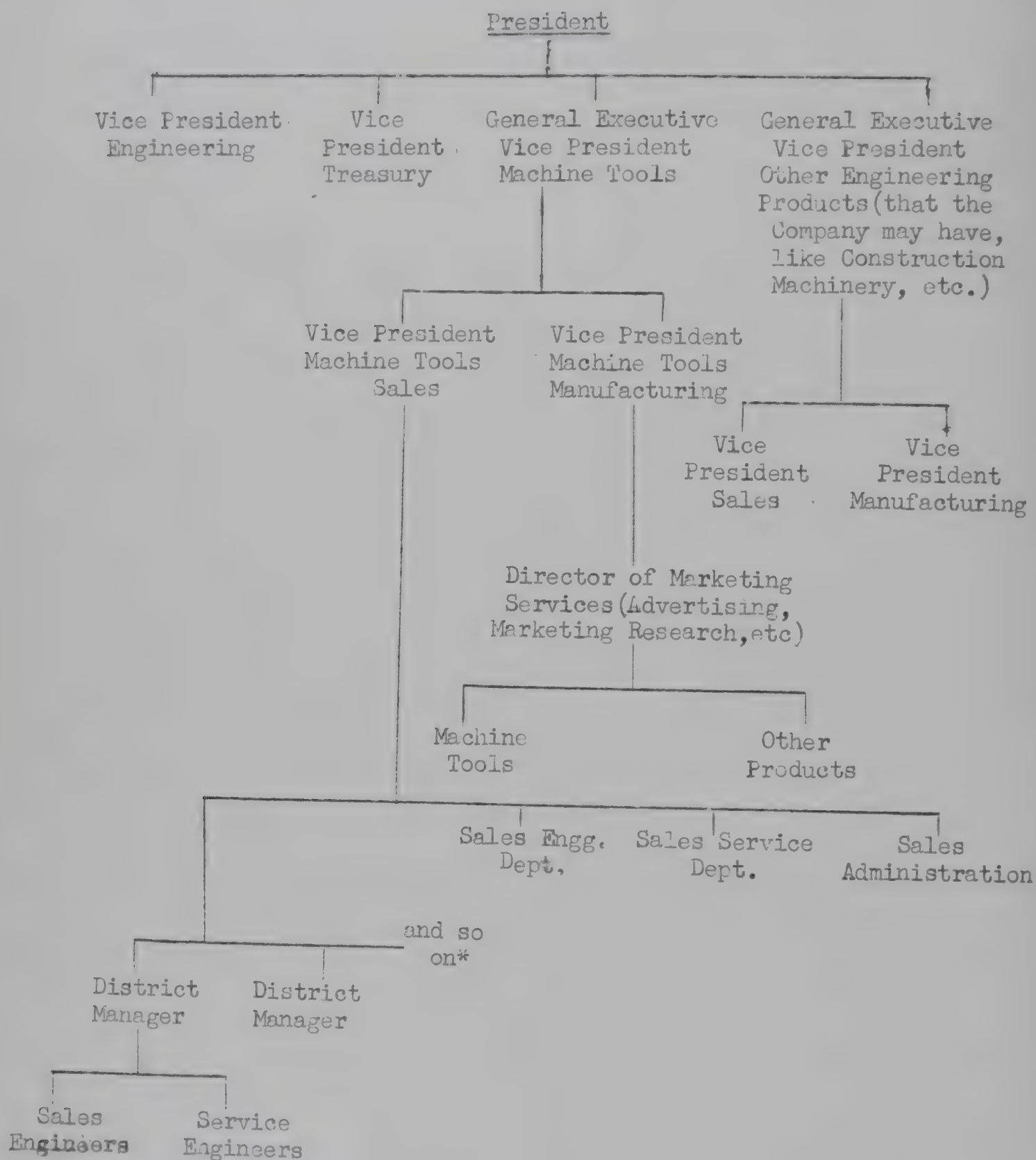
It can be seen from this diagram that there are specialized departments for the major marketing functions like research, sales engineering, selling, and servicing.

5.2 Distribution of Imported Machine Tools in the U.S.

The majority of foreign machine tool producers selling in the U.S. have a subsidiary office or agent in the U.S. to act as the exclusive national importer and perform many of the functions handled by the marketing departments of domestic producers, including appointment of regional distributors, sales promotion, and back-up service with factory-trained servicemen and spare parts.

According to Kurt Ucko, executive vice-president of Kurt Orban Co., a U.S. importer, "for all intents and purposes, we are a domestic machine tool company with a trained international sales and service organisation, without wholly-owned manufacturing facilities". (Machinery, October 1965, p.130).

Table 24



" There are 18 District Sales Offices for one large company.

Obviously selection of the national distributor is crucial in determining the success of the export marketing effort. Where actual selling is done through regional machine tool distributors, the distributors deal with the manufacturers only through the national importers.

There is, however, a great deal of variety in the nature of these national importers, distributors or agents.

(1) In some cases the national representative has a fiduciary tie to the foreign machine tool producer. It may be a branch of the manufacture's marketing department, a subsidiary company, a member of the same international industrial group, or even the parent company.

(a) For example, Marubeni-Iida is a Japanese trading company which owns or has a controlling interest in some of the machine tool manufacturers for which it is the selling agent. Kanematsu-Gosho has a similar holding company nature. Hunter-Douglas International owns Wotan Company of West Germany and has a tie to Fine-Blanking, Ltd., of England, for which it is the U.S. national distributor.

(b) In early 1966, Hitachi Seiki Co. Ltd., Japan's largest manufacturer and exporter of machine tools, with over \$ 4 million of exports to the U.S. in 1967 (out of total firm exports of \$ 5.2 million and production of about \$ 15 million), established a wholly-owned subsidiary in New York, to aid and coordinate the activities of distributors around the country.

(c) BSA Tools, Ltd. of England operates through a branch, BSA Tools, Ltd. in New Jersey, while Charles Churchill, Ltd. of England operates through Churchill-Froriep Corp. in Connecticut. Elliot Machine Tools, Ltd. of England has its own distributor B.Elliott Machinery Inc. in Michigan, which also handles products of The Press and Shear Machinery Co. Ltd. of England. Duplomatic of Italy has a branch office in California. CMC of Italy, with the trade name Bakuer, sells through Bakuer American Co. in Illinois.

(2) In some cases the national representative has a licensing arrangement with the foreign producer, i.e. the foreign producer manufactures machines under license from an American company, which assumes responsibility for marketing.

(3) In some cases the local representative is an overseas branch of a general trading house, often having a large number of departments dealing in products ranging from textiles to machine tools, and handling both imports and exports to a large number of countries in the world.

(a) This pattern is typical of Japanese distribution in the U.S. A notable feature of the Japanese marketing organisations is that there is often a Japanese firm acting as national importer and distributor in New York.

For example, Ataka America is a general trading company with departments for machinery, chemicals, lumber, textiles, metals, etc. It handles both imports and exports for Japanese manufacturers in the U.S. market. In some cases the Japanese manufacturers have an ownership interest in Ataka, and Ataka may provide capital to finance production and export. Ataka is not simply an agent but buys and sells on its own account. It buys Japanese machine tools from the manufacturers at prices which are FOB Japan. It adds its own mark-ups before sale. It handles non-competitive models of machine tools from about fifteen Japanese manufacturers.

Marubeni-Iida is another general trading company specializing in Japanese goods. It started its U.S. operations with silk textiles from Japan long before World War II and, after ceasing operations in the war, was re-established about 15 years ago. In machine tools it handles only Japanese products, and for these manufacturers it is the exclusive U.S. representative. The head office of the company is in Japan and all dealings between the American office and the manufacturers go through the head office. The Japanese office is primarily clerical in function, handling orders secured elsewhere and arranging shipping and other export details, and it does not contribute to the actual sales effort. Marubeni-

Iida buys machines and resells them and does not simply book orders. The Tokyo office buys the machines out-right from the manufacturer, and the New York office buys them from the Tokyo office; thus the Tokyo office earns a markup.

Kanematsu-Gosho is a general trading company which handles imports and exports and domestic distribution in Japan of industrial products, including machine tools. It is the exclusive U.S. distributor of the products of four Japanese machine tool manufacturers.

(b) Advantages and disadvantages of this type of distribution:

According to one trading house, some of the contacts leading to sales by the machinery department are initially made by other departments. For example, the textile department learns of opportunities to sell textile machinery and refers them to the machinery department. This suggests that the larger trading organisations have certain advantages in terms of information and contacts.

According to another, their marketing structure suffers because the American office deals with the manufacturers in Japan only through the head office of the trading company in Tokyo. If they could deal directly with the manufacturers, this could eliminate one commission and hence make prices more competitive. It would also facilitate communication, since one problem they face is that Japanese manufacturers are isolated from the U.S. market and do not know much about it.

(4) In some cases the national representative is a purely U.S. firm which specialises in the distribution of machine tools. However, since U.S. manufacturers do not appoint national selling agents, there does not exist a developed network of such distributors. Consequently, this has not been the usual pattern for foreign machine tool manufacturers to follow. It is used by some U.K. and German manufacturers, who unlike the Japanese do not have their own offices in the U.S. in some cases. Where a U.S. firm specialising in machine tool distribu-

tion is the national agent of a foreign machine tool manufacturer, the U.S. firm typically got its start in one of two ways:

- (a) It may have originated as a regional distributor for machine tools, or may handle the products of some manufacturers on a regional basis at the same time that it serves as national representative for others. An example is Machinery International in Chicago, which is the national distributor for the West German Donau machine tool company but also a regional distributor for a number of other imported lines which have other national distributors in the U.S. It has been handling West German machine tools since the early 1950's.
- (b) In a number of prominent cases the national importer is a dealer who originally dealt in used machinery and has added imported lines. This is most common for very low priced standard machine tools.

For example, S & S Machinery Co. in Brooklyn, N.Y. imports equipment including Italian lathes and Spanish milling machines. It is a very large company, which exhibited 30 machines at the 1968 ASTME exhibit. Apparently S & S provides much of the financing for the production of these machines. In any case, they are produced in bulk orders to S & S specifications and are labelled with a typically American sounding brand name, like "Lansing", "Toledo", "Cleveland", "Speed-Master", and "Supermill". The purpose of giving them American names is partly to increase American acceptance but largely so that the distributor's sales efforts go to building its own brand name and not the foreign manufacturers. This assures continued dependence of the manufacturer on the distributor. Naturally, it means that the distributor handles all sales promotion. S & S Machinery is the U.S. agent for several Italian firms, including Alpa, C.M.T., San Rocco, and Mannaioni.

- (c) Kurt Orban Co., which began importing in the Korean war, is independent but works closely with foreign manufacturers:

"By virtue of our position in the import market, we can demand and get immediate attention from our foreign suppliers. And since we have no language barrier to cope with (many of our engineers are foreign trained and multilingual) and since our people have intimate knowledge of the capabilities of our suppliers, we have developed an efficient working relationship across the board" (Machinery, October 1965, p.130).

- (d) Roy Machinery and Sales, Inc. in Connecticut manufactures headers, slotters, thread rollers, and wire drawers and is the distributor for Sacma Headers from Italy.

5.3 Direct vs. Indirect Distribution

New machine tools in the U.S. are sold to the final customer both directly through the manufacturer's own sales organisation and through independently owned machine tool distributors. It has been estimated that half or slightly more of the value and a higher percentage of the units of new machine tools are sold through distributors.

In deciding whether to sell directly or through a distributor, manufacturers and distributors suggested that the primary considerations were:

- (1) Control - Manufacturers prefer direct sales because by retaining control of sales they can assure themselves of proper sales promotion and service and feed back of information from customers.
- (2) Commissions - Manufacturers prefer direct sales because they earn the profit from distribution. For example, Warner & Swasey has gradually moved away from indirect distribution because with increasing volume they have found it cheaper to have a direct sales force. Distributors have to be paid a commission of 10% on sales while the cost of a direct sales force for a company with Warner & Swasey's turnover is $7\frac{1}{2}\%$ of sales.

- (3) Economies of scale in distribution - Except for high-priced, large, or sophisticated machine tools; specialised machine tools where the total number of customers is small; and customers with large machine tool budgets, it is inefficient for a salesman to handle the machine tools of only one manufacturer. He can show a full line to a user almost as easily as a single tool, and the user prefers to deal with salesmen who can offer a full line rather than a large number of individual salesmen.
- (4) Knowledge of markets and reputation with customers - Unless it sets up a very elaborate sales organisation, it would be hard for an individual manufacturer to match the independent distributor's knowledge of customers in his territory and their requirements. This is especially true if the manufacturer must start from scratch, because many distributors have been in business for many years.
- (5) Complex machinery requiring specialised knowledge and technical skill - In the case of very specialised or sophisticated machinery, such as units for the automotive industry or N/C equipment, regional distributors often do not have the technical and financial resources necessary to handle selling and service, training of operators, and financing of sales. As a result, manufacturers often sell such equipment directly. Nevertheless, some distributors are competent to handle N/C equipment, and the trend is for distributors to handle more sophisticated equipment.

Very few U.S. manufacturers sell exclusively through their own direct sales organisation. One that does is a manufacturer of machine tools for the automotive industry. There are only about twenty-five customers for such machinery, both the manufacturer and most of its customers are located in Detroit, orders are typically very large, and the machines are very specialised and require a specialised sales/service force.

However, because of the substantial economies of scale in distribution, direct selling is impractical for many machine tool builders. As a result, some U.S. machine tool manufacturers sell entirely through independent distributors.

Others sell some lines or sell to some customers through distributors, while reserving some lines (particularly expensive or sophisticated units like N/C machine tools), or some customers (particularly ones with large machine tool budgets), or some geographical area (e.g., the major markets or areas where customers are closest together like the industrial belt from the Great Lakes to the Northeast) for their direct sales organisation. Sales of conventional, general purpose machine tools, and sales to outlying areas, are normally through distributors. For example, Cincinnati Milling Machine Co., the world's largest producer of machine tools, sells all its standard lines through distributors and employs its own sales force for the sophisticated machines.

Distribution of machine tools through independent distributors is organised on a regional basis. Typically the U.S. manufacturers' own marketing department serves as the only part of the distribution system which is national in responsibility. Directly under the marketing department are the independent distributors, each with the exclusive responsibility of selling directly to the end users in a specific geographical area, normally one metropolitan metalworking production area and the surrounding territory for the major markets or two or three or even several States where there is a lower concentration of users. Typically a U.S. manufacturer that uses indirect distribution has a dozen to two dozen such distributors around the U.S.

These distributors are typically independently owned, have four to six⁽¹⁾ qualified machine tool sales and/or service engineers or people who have worked for a number of years in a machine tool shop or metal working production line, and handle the machine tools of a dozen to two dozen different manufacturers. Generally they sell a full range of different types of machine tools, do not handle products other than metalworking machine tools, and do not handle directly competitive machines built by different firms.

Imported machine tools in the U.S. are sold to the final customers both directly by the importer's own sales organisation and through independently owned machine tool distributors. The considerations governing the choice of direct sales or sales through distributors

(1) According to the AMTBA, the average is 14 employees. The ones we saw had 4-6 engineers.

are the same as for U.S. manufacturers. Because a large percentage of imported machine tools are standard and lower priced types, and because many national importers have less experience with the American market than do U.S. manufacturers, direct sales are less for imported than domestic machine tools. Ataka stated that almost all its sales are through its 35 regional distributors, though it does have a small number of direct sales; Marubeni-Iida has 22 distributors and the number is increasing, and it stated that few of its sales are direct to end users. Both said they have few contacts with end users.

In many cases the distributors for imported machine tools are the same ones that handle new U.S. machine tools, often members of the American Machine Tool Distributors' Association. However, in other cases the distributors handle only imported machine tools or combine distribution of imported machine tools with used machinery and are members of the Machinery Dealers National Association. In either case they have the same regional sales territories and perform the same sales and service functions that distributors of U.S. machine tools provide. The basic difference is that for imported machine tools they do not deal directly with the manufacturer but its national representative.

One of the major reasons for the success of imports in the U.S. market in recent years is that many foreign lines have been distributed through first class experienced distributors with established clientele.

5.3.1 Direct Distribution by U.S. Machine Tool Manufacturers

Sales Force - Size, Selection, Training and Compensation

The direct sales forces usually are relatively small, as would be expected for a relatively sophisticated industrial product like machine tools. For example, Burgmaster Corporation has 25 direct salesmen to cater to their key marketing areas in New Jersey, Detroit, Chicago and Los Angeles. Warner & Swasey has a sales force of 55 men. Lodge & Shipley, with sales of \$ 16 million, has 12 salesmen who handle 40% of their turnover.

Personnel with an engineering background are preferred for field forces. A technical degree and some shop experience is usually considered essential. Salesmen are recruited only after ensuring that they have the qualities necessary for selling.

U.S. machine tool manufacturers stress training of their salesmen. To quote the Domestic sales Manager of Cincinnati Milling Machine Company, "They must know all the answers to customer's problems and questions."

All salesmen are given a rigorous training programme before being sent to the field. The nature of the training programme varies with the background of the trainee. In the case of fresh graduates from college, the training programme varies from one to two years, the bulk of which is in the factories, on the shop floor. They are given the necessary technical knowledge of the machine, in terms of the type

of parts that can be machined from a particular machine tool etc., from the point of view of the customer.

Salesmen recruited from the shop floor are given field training in selling technique before being assigned to an area.

The importance of training for the salesmen of third-party distributors is also well recognised, although the training period is shorter because they usually handle only the simpler lines.

The salesman's compensation is split between salary and commission, which guarantees a steady minimum income. An interesting feature of Warner & Swasey's compensation plan is that all personnel of the sales department from the district manager downwards and including the service staff get a commission on total sales in the district. This system acts as an incentive to all the sales personnel in the district to develop and sustain sales.

Sales Control

On the average the salesman makes about 8 to 10 calls per day in the case of standard general purpose machines and about 3 to 4 in the case of special machines. The frequency of calling on a customer depends on the size of the potential business. In the case of a simple lathe, the salesman typically makes an initial call and only one follow-up whereas it takes anywhere from one to two years to sell an N/C machine.

One advantage of direct distribution is the greater control and information flow possible. Every call is followed by a call report which furnishes information, on competitors among other things. A specimen of such a call report is provided in Appendix 17.

The call report has 3 copies - one copy is sent to the head sales office; another is kept by the salesman; and the last copy is sent to the advertising department. The call report indicates whether the persons seen in the customer-firm should be put on the company's mailing list or, alternatively, removed from the present list. In fact, the salesman takes the major responsibility for creating and maintaining the mailing list.

In addition to the conventional call report, Warner & Swasey's salesmen send in "lost business reports". A specimen report is presented in Appendix 18. This lost business report is not a punitive measure - there is no penalty for lost business. This report is used to analyse the reasons behind losing orders to competitors. This lost business report is a key source for ideas on product development.

The district manager performs the traditional sales supervisory function in terms of overseeing the activities of the company sales force as well as the distributors, working out the call plans of the salesmen and preparing aggregate sales forecasts for the district on the basis of the forecasts given by the salesmen and distributors for individual areas. Further, they are usually required to send a weekly letter to the head sales office covering, among other things, important personnel changes in the customer firms, new projects, etc.

Generally, the district manager is a promoted sales engineer. However, there is increasing recognition of the importance of managerial skills and the need for training in marketing management for these promoted district managers. After all, they were originally technical people who have essentially received training and experience in just sales. District managers are sent to marketing courses that are conducted from time to time by the American Marketing Association. Also, district managers with more background in management than in technical areas are being recruited outside.

Finally, the sales vice president of the company keeps a close watch over the sales offices. For example, the vice-president of sales at Warner & Swasey reads the daily call reports of the 53 salesmen so that he has intimate knowledge of the performance of the sales force and the activities of competitors. Indeed, he was able to give the Survey Team the following information on the average breakdown of a salesman's time and the productivity of his calls:

Out of 2,000 hours in a year, the salesman spends 50% in travel, 35% in making sales presentations and exploring new opportunities at customer firms and 15% in closing sales. About 40% of his calls are productive.

Servicing

Servicing is regarded as an integral part of the selling function and is under the chief executive of the sales department, though, of course, it has separate personnel. The sales department

use service as a sales tool in terms of deciding the priorities for the service engineers. Each sales district (or group of districts in some cases) has its own service engineers. Rapid servicing is essential for operation and success in the U.S. market because of the necessity to sustain the production flow. The director of manufacturing engineering at the Ford Motor Company best expressed this as, "We buy time ... we are willing to pay hundreds of thousands of dollars premium to protect delivery dates" for our product."

In areas where manufacturers employ distributors, the servicing is carried out by the staff of the manufacturers or distributors depending upon the product. Complex machines necessarily have to be serviced by the manufacturers' service staff.

The service representatives of the manufacturer are upgraded shop apprentices with about 4 to 5 years experience in the shop. He serves as the direct contact with the customer to ensure that the machines keep running and to provide feed back to the company on the performance of the machines. In most cases, he tries to train the customer's maintenance staff in the course of installation, servicing and repairing so that small jobs arising later can be promptly attended to by the latter without having to wait for him. Further they also help the sales engineers in guiding them on the decision-making points and whom to contact in the user firms.

In the case of distributors, one of the important criteria of selection is servicing facilities.

Sales Engineering

The larger U.S. machine tool manufacturers like Cincinnati Milling Machine Company, Warner & Swasey, Burgmaster Corporation and R.K. Le Blond Company, have specialised sales engineering departments to provide pre-sale engineering services to customers. These departments carry out feasibility studies free of charge for customers at the request of the salesmen.

At Cincinnati Milling, the sales project engineer works with the product development engineers in the manufacturing division in order to develop machines to customer specifications.

The sales engineering department at Warner & Swasey develops special accessories and cutting tools made to customers' specifications and requirements. This department has three sections: application estimation, tool design and tool testing. Estimates are prepared for customers on request of the salesman who should ensure the customer's interest in Warner & Swasey before asking for a special estimate. Warner & Swasey provide this as a free service although it costs them \$ 300 to prepare an estimate. The estimates provide technical information for engineers and financial information for management.

The customer proposal department at Burgmaster Corporation designs special machines using their standard machines as the base. Again, the company prepares these "special" designs when submitting bids and takes the risk of losing the bid.

Sales Service

This Department is again found in the larger manufacturers' organisation, particularly those dealing in sophisticated and custom made machines. Training schools are run by this department free of charge for the maintenance personnel of customers. The trainees are required to pay only for their own travelling and living expenses. This kind of promotional activity is looked upon as a fringe benefit for the customer and also as support to the sales force in the field of preventive maintenance for customers.

Further, this department organises educational seminars, refreshers and other types of training courses for the customer's technical personnel. In some cases, this activity may actually be carried out by the technical wing of the machine tool manufacturer. For example, in Cincinnati Milling, at the time of the visit of the Survey Team, the Research & Development Centre had just completed a 3-day Seminar for the aircraft industry, which was attended by personnel from 20 customer firms. The Survey Team saw a huge custom-made machine for Boeing Aircraft (it is supposed to be the biggest milling machine for milling wings of jumbo jets) for \$ 2.5 million being assembled on the shop floor.

Marketing Services

Advertising in terms of preparation of catalogues, mailing lists, print advertisements in trade journals, service manuals and other types of promotional activity like arranging sales conferences, participation in trade fairs and exhibitions etc., are handled by one section in the marketing services department.

The other wing of the department is marketing research, which includes competitive intelligence and sales forecasting.

Liaison with Research & Development

Liaison between the marketing and technical wings of the organisation is extremely effective. There are regular meetings at the vice president level every month where ideas filter in from the fields and where the decisions on new product ideas for R&D are taken.

Burgmaster Corporation cited a typical instance where the idea for a new machine came from the sales department. The specifications and price were all given to the engineering department, which came back with a product design whose price was too high. The sales department then made the engineering department go back and use their ingenuity to reduce the price to what was considered "marketable".

Further, there is a strong sales orientation in the technical wing of the organisation. This is best illustrated by what the Survey Team observed when going round the manufacturing plant of Cincinnati Milling. The slogan "Marketing is you and me" was found at the desk of every operator to help inculcate this spirit of customer-orientation among the operators. We were told that the operators are trained to be helpful and informative to customers who are brought to the plants to look at the machines on the floor.

In terms of the link between the sales and technical departments, a company like Burgmaster Corpn, goes so far as to make the final inspection of machines a sales function. The sales department has 3 inspectors on the assembly floor who accept or reject the machines before shipping them out to direct sales offices and distributors. This provides an independent cross-check on the quality of the machines.

5.3.2 The Manufacturer - Distributor Agreement

In the case of sales through distributors, the division of responsibilities, commissions, duration of the distributorships and the like are fixed by the manufacturer - distributor contract. (See Appendices 19 and 20 for more details). It should be clearly understood that in drawing up the contract the exercise of profit maximization may be constrained by U.S. anti-trust laws.

"Buy-Sell" vs. "Representative" Relation:

In some cases, the manufacturer and distributor have a "buy-sell" relation, with the distributor buying for his own account and then reselling to the customer. In other cases, there is a "representative" relation, with the distributor acting as an agent, soliciting orders and sending them to the manufacturer for acceptance, and earning a commission on sales.

Limitation of sales territories and customers:

In the case of the "buy-sell" relations, any attempt by the builder to reserve to himself or for particular distributors certain customers or customers in certain geographical areas would be unlawful (Schwinn case, U.S. Supreme Court). However, the builder can -

- (a) Grant the distributor an "exclusive" franchise by agreeing not to sell directly to customers or to certain classes of customers located in a particular geographical area served by the distributor and not to sell to other distributors located in that area.

- (b) Give the distributor "primary responsibility" for developing sales and servicing of machines in a particular geographical area and judge the distributor's performance and continued affiliation with the builder on the basis of the distributor's sales in that area, and
- (c) Compensate the distributor for his work in his area of primary responsibility by awarding him an appropriate commission on sales made by other distributors to customers located in that area.

On the other hand, in the case of the manufacturer - representative relations, it is probably permissible for the machine tool builder to impose geographical or customer restrictions on such distribution, but several recent court decisions have indicated limits on the right of manufacturers to control the distribution of their products through geographical selling arrangements.

Within these limits, the manufacturer-distributor contract may be of two types:

- (a) An "exclusive" or "area of primary responsibility" contract, which specifies that only one distributor can sell a given line to a given geographical area.
- (b) "Open-line", "semi-exclusive", or "protected inquiry" contract, which allow more than one distributor to sell a given line in a given geographical area, but restrict such competition in certain ways.

The AMTDA recommends the "exclusive" type of contract on the grounds that it provides more incentive for the distributor to work for sales. In order to sell a machine, a salesman must

spend a substantial amount of time calling on customers, but since he works on commission or mark-ups he is paid only when he makes a sale. A distributor will make this investment in sales effort only if he has protection that the customer will not be able to get the machine elsewhere if he ultimately decides to buy.

Thus, under the "exclusive" contract the distributor has incentive to invest time, effort, and money in sales effort. Under the "open line" type contracts, distributors are apt to restrict themselves to booking orders without actively trying to promote sales.

The "open line" type arrangements are used sometimes in selling very simple machines. This makes their distribution more like the distribution of hardware or general consumer products.

Sales promotion and pre-sales service:

It follows from what has been said that unless the distributor has an exclusive contract, the manufacturer will have to bear almost all the responsibility for sales promotion. However, with an exclusive contract it is possible for the manufacturer to delegate more of the sales promotion to the distributor. Of course, the division of responsibility will be reflected in the size of the distributor's commission.

Typically the manufacturer (whether US or foreign) is responsible for:

- (1) Supplying the distributor free of charge with descriptive sales brochures for each machine, including technical specifications, usually elaborately printed with multicolour pictures, which the distributor gives to potential customers.
- (2) Providing objective tests of the machine's precision and machining speed, and, if required, supplying the customer with a sample of the part he wants to make on the machine (so that he can judge the precision, finish, etc of work) and time studies giving the machining time for the part.
- (3) In the case of custom-built machinery, the manufacturer gives design sketches, quotations, and delivery schedules on the basis of product drawings or samples, specifications, and production requirements supplied by the customer. There is close cooperation and discussion between the manufacturer and customer during manufacture.

Also, the manufacturer - or in the case of a foreign machine tool the national importer/distributor or the manufacturer and importer/distributor jointly - is responsible for:

- (4) Advertising in trade journals. (A detailed discussion of trade journals is given below).
- (5) Participating in industrial machinery exhibitions. (A detailed discussion of US machine tool exhibitions is given below).

The distributor, or manufacturer if it does its own distribution, normally promotes sales by:

- (1) Sending direct mailings, usually single sheet or thin inexpensively printed brochures. Some contracts provide for manufacturers or national importers to share such costs.
- (2) Calling on customers.

- (3) Demonstrating the machine tools in his show room or arranging for demonstrations in the plants of users or the manufacturer. Most, but not all distributors have a show room and/or warehouse for stocking machines and giving individual and sometimes open-house demonstrations. It is almost always the distributor who provides the capital invested in the stock of machines in the display room or warehouse, not the manufacturer. However, some manufacturers that want to promote sales send machine tools on consignment and a foreign machine tool manufacturer entering the market for the first time may well have to do this if the distributor is unwilling to bear the cost and risk. Some manufacturers also send a factory representative to take part in open-house demonstrations.

In most cases the national distributor of foreign machine tools maintains a warehouse and machine tools in the U.S. Most say that they try to anticipate sales and keep a regular supply of machines in stock or on order even before customers are found so that sales can be made with immediate delivery from stock. A number make immediate delivery a major selling point. Estimates of the percentage sold from stock varied from over 50% or more. Of course, apart from the standard, general purpose machines, many sales are based on special orders and the machine is assembled for a specific customer. In these cases it is difficult for a distributor to keep machines in stock.

In addition, all national distributors of foreign machine tools maintain a stock of spare parts. Generally the manufacturer provides a list of parts which are susceptible to breakage or wear so the distributors know what to stock. In addition, distributors

stock items such as metric screws which are not available in the U.S. for foreign machine tools. Moreover, according to one distributor of foreign machine tools, "we're beating parts and service complaints by use of air freight".

(Iron Age, March 21, 1968 p.75).

Credit:

The normal terms of payment to the manufacturer in the U.S. are cash 30 days after delivery (usually there is no down payment in advance of delivery, unless a machine is built to special order or a customer is considered risky) whether the manufacturer sells the machine to a distributor or directly to the end user. The distributor in turn normally sells the machine for cash in 30 days to a customer. Sometimes payment may be extended to 60 days. Cash payment within 30 to 60 days is one of the important attractions of the U.S. market for Indian machine tool manufacturers.

When credit is extended to either the user or distributor, normally either the user himself or the distributor arranges this, although in some cases the manufacturer may also provide the arrangements. The actual credit is usually extended by banks, specialised finance companies, or leasing companies rather than the manufacturer or distributor.

Of course, there are exceptions. Some, but not all, machine tool manufacturers have facilities for deferred payment or leasing with option to purchase. For example, Warner & Swasey offers the programmes outlined in Appendix 21. Others say they do not like to provide financing but may do so if there is no alternative way to make a sale. S & S machinery, a large importer of low price machines, offers terms up to 10 years and rentals.

Regardless of the source of credit, virtually all credit beyond 30 days is extended on a commercial basis and not as a concession to buyers. However, we did find cases where a customer would be allowed 60 or 90 days to pay without interest on a large order.

After sales service:

In order to sell machine tools in the U.S., it is essential that the manufacturer provides the customer with assurance that full service and spare parts will be available quickly in case of breakdown or other trouble. (A large share of service calls come from users having difficulty in operating a machine properly rather than breakdown). Downtime can be very costly to machine tool users, especially since the breakdown of one machine may stop others performing subsequent or interdependent operations (e.g. in a transfer line), reducing production and perhaps making it impossible for the user to fulfill a contract.

From the point of view of Indian machine tool manufacturers contemplating entry into the U.S. market, the important thing to realize is that there are almost no complaints in the U.S. about the adequacy of service provided by U.S. manufacturers. Because of this competition, it is clear that unless the Indian manufacturer can establish similarly efficient servicing in the U.S., there is no prospect for penetrating the U.S. market.

Normally machine tools have a six to twelve month warranty (twelve months is standard) at one shift usage against defective parts and workmanship. During that period spare parts are supplied without charge, but there may be a charge for labour. After that period, the user pays a normal commercial charge for service (e.g. one distributor charges \$ 80 per day plus expenses for a serviceman).

While there is no question that such service must be available, the responsibility may be divided in different ways between the manufacturers and distributor. Established distributors invariably have a staff of service engineers, who have the qualifications and responsibility for providing basic service. When trouble arises, they are usually called first to determine the problem, order the necessary spare parts, and make simple repairs. Manufacturers have factory engineers available to provide back-up service in case distributors cannot solve a problem alone. The more sophisticated the machinery, the greater is the share of the manufacturer in the

actual servicing. In some cases, even though the machine is sold through a distributor, the manufacturer takes care of almost all service.

Apart from breakdown service, there are a number of other types of after-sales service offered by many machine tool manufacturers or distributors, particularly in the case of sophisticated and expensive machinery. In case training is necessary to use a new machine tool, such as a numerically controlled unit, most manufacturers will provide a training course on programming, use, and service of the machine at their own or the user's plant. For example, the Cincinnati Milling Machine Co. has an institute with a capacity of 200 trainees to train their own and customers' workers. However, they usually make an additional charge for this.

Also, most manufacturers or distributors provide supervision of installation or erection and check-out the machine before it is initially switched on at the user's plant. In some cases there is an additional charge for this, in others there is not. Such inspection is in the manufacturer's and distributor's interest to provide protection against unnecessary claims during the guarantee period. Users can have spare parts air-freighted to them, but this is at the customer's expense.

In the case of all types of after-sales service, the crucial thing is that it be available, not whether there is an additional

charge made for it. Naturally, whether an additional charge is made is reflected in the selling price of the machine. Some distributors say that since some users (for example, those engaged in machine building who have the necessary skill to do their own servicing) do not require after-sales service for installation, breakdown, etc., they prefer to sell the machine with a minimum of extra service charges included in the price and make the services available at an additional charge to those requiring them.

There is a trend toward a larger share of sales and service responsibilities being borne by the distributor, in part because the local distributor is better situated to provide fast service and in part because the distributor wants to earn the extra income he gets as his responsibilities are increased.

Pricing and other competitive terms:

In the case of the "buy-sell" relation, the builder cannot legally control the prices at which its distributor sells to customers. The builder may have suggested list prices but he cannot legally coerce distributors to sell at these prices, for example, by threatening to terminate the distributorship. Similarly, the builder cannot attempt to control terms which have competitive significance, such as terms of payment, credits, and distributor warranties.

On the other hand, builders can set customer prices and control other terms and conditions of sale to the customer in the case of the "representative" type relation.

In practice, the manufacturer normally establishes a selling price to the user, and while it may not legally force sales to be at any given price, the manufacturer's power to terminate the distributor contract enables it to enforce its suggested price. As a result, machine tools in the U.S. are quoted at uniform prices (ex-manufacturer's works or importer's warehouse). Prices are firmly set and are freely given out. No evidence of price cutting, rebates, or other concessions was found. Manufacturers object to selling at a discount on the ground this tends to create doubt about the true quality of the machine.

In the light of the extensive sales and service functions of national distributors for imported machines, functions which are often handled by manufacturing firms in the case of U.S. machine tool companies, perhaps it is not surprising that the final selling prices of foreign machine tools in the U.S. are 150-250% of the F.O.B. price in the country of origin, with 180% being the most common figure. Naturally prices and commissions depend on what services are provided and which party is responsible for them.

Commissions:

We were told that the average commission on a U.S. made machine tool for the regional distributor is 10-12% of the final sales value of the machine. There is no fixed rate suggested by the AMTDA, and the actual commission granted will depend upon:

- (1) The division of sales and service responsibilities between the manufacturer and distributor. The more the distributor does, the larger the commission. As a rule, distributors handle a larger share of sales and service responsibility on smaller standard equipment than on larger, specialised, and sophisticated equipment, and hence percentage commissions on the former would tend to be greater.
- (2) The inducement the manufacturer wants to give the distributor both so that he will accept the distributorship and so that he will devote sales effort to selling the machines.
- (3) The reputation of the machines. A lesser known brand involves more risk and has lower turnover or requires more sales effort on the part of the distributor, and hence it requires a larger commission. Because of these factors, commissions on imported machines are higher than the 10-12% on U.S. machines.

5.5.3 Distributors' Associations

American Machine Tool Distributors' Association (AMTDA):

With 250 members, the AMTDA is the major U.S. trade association of machine tool distributors. To be eligible for membership, a distributor must have been in business at least three years and "have proven qualified in the field of financial responsibility, technical knowledge, and marketing services." In addition, members must sell machine tools produced by at least three U.S. manufacturers, and until recent years members in fact handled very few imported lines. However, in the past few years members have been representing more and more foreign manufacturers.

For additional information write to:

Mr. James C. Kelley,
Executive Vice-President
American Machine Tool Distributors' Association
1500 Massachusetts Ave. N.W.
Washington, D.C. 20005
U.S.A.

Machinery Dealers National Association (MDNA)

A second trade association to which some U.S. machine tool distributors belong is the Machinery Dealers National Association. In the U.S. by convention the term "distributor" is applied to a firm selling new machinery while the term "dealer" is applied to a firm handling used machinery. The MDNA originally represented machine tool dealers selling used machinery, but a number of these dealers have also taken on distributorships for new lines. In particular, a number of foreign manufacturers initiated distribution in the U.S. through dealers, in used machinery and some of these dealers are now the largest distributors of new imported machine tools (Examples are S & S Machinery and Morey Machinery, both in New York). There is some overlap of membership between the AMTDA and MDNA.

For additional information write to:

Machinery Dealers National Association
1400 20th Street N.W.
Washington D.C. 20036
U.S.A.

5.3.4 Contrast of Machine Tool Distribution in the U.S.
and Elsewhere

There are important contrasts between distribution of machine tools in the U.S. (and some of the other advanced economies) and elsewhere.

In the first place, only an economy with a large metal-working industry can support a specialized machine tool distribution

network. In less industrialized economies, machine tools are distributed together with a range of other industrial machinery or equipment of all kinds.

Second, in the U.S. the machine tool distributor bears a large responsibility for promoting sales, and typically, because of strong competition they are aggressive in calling on customers and investing in sales effort. In some countries, the distributor does not have such an important role between the manufacturer and user, and instead chiefly books order when customers come to him. As a corollary, many other economies do not have distributors trade organisations of any significance corresponding to the AMTDA.

5.4 Sales Promotion in the U.S.

5.4.1 Exhibitions

Among all the methods of sales promotion for machine tools, two play a key role: Exhibitions/demonstrations of machine tools and personal sales calls on the customers by distributors in whom they have confidence. Other methods, the most important of which is advertising, are used extensively, but without the exhibitions and personal calls by good distributors, they would not be very effective.

Exhibitions of equipment play a central role in industrial marketing. They permit the participants to give live demonstrations of their equipment to large numbers of potential buyers and distributors. A substantial volume of sales is transacted at such

exhibitions, and many manufacturers and importers advertise for and find distributors at them. Apart from such immediate business transactions, the exhibits serve as a means of informing a wide audience of what a manufacturer or country has available. Not only do a very large number of customers attend but the major exhibits are given very extensive coverage in special issues of all the relevant trade journals, thus providing the participants with free publicity.

Regular participation in such exhibitions with machines suitable for the U.S. market by Indian machine tool manufacturers is a basic requirement for entry to the U.S. market.

At current U.S. exhibitions, the highlights are always the new sophisticated equipment introduced and the exhibits of foreign machine tools, and reviews of the exhibits focus on these. The exhibitions are international, with large foreign representation in the exhibits and audience. (It should also be noted that American machine tool producers, users, and distributors send representatives to machine tool shows abroad. For example, some 1100 Americans attended the European machine tool show at Hannover in 1967, and a number of European manufacturers signed contracts with U.S. distributors there.)

There are three major machine tool exhibits in the U.S. Two of these, The American Society of Tool and Manufacturing Engineers National Tool Exposition (ASTME show) and the Western Metal

and Tool Exposition (WESTEC show), combine the exhibition with a convention of tool engineers, at which technical seminars are held and papers presented. Both are sponsored by ASTM, the latter jointly with the American Society for Metals. The third is sponsored by the NMTBA and is held every two years. The next will be held in 1970 at Chicago.

The two shows sponsored by ASTM allow foreign participation, and the NMTBA will allow foreign participation beginning in 1972. In order to show the role of exhibitions in the marketing of machine tools in the U.S., and to show how foreign machine tool manufacturers have used these exhibitions to promote sales in the U.S., we are providing some of the relevant details for the ASTM show, which our survey team visited in Philadelphia in May 1968. Additional details will be found in Appendix 22. This exhibition has been held annually since 1938.

- (i) Duration of the Philadelphia ASMA Exhibition: 5 days
- (ii) Attendance at the Exposition: (audience size)

Table 24

Location of ASTM Shows and Attendance

<u>Year</u>	<u>Location</u>	<u>Registered Attendance</u>
1963	Chicago	40,667
1964	Detroit	42,317
1965	Cleveland	34,476
1966	Detroit	43,216
1967	Chicago	43,278
1968	Philadelphia	41,416
1969	Chicago	More than 40,000 estimated

Source: Appendix 22.

A detailed breakdown of the 1967 attendance by industry and function is presented in Appendix 22. This indicates the exposure achieved at such an exhibit. According to A3TME, "most of these men have the authority to select or recommend the equipment needed in their plants".

(iii) Total Participation by Exhibitors

Table 25

Floor Space and Number of Exhibitors at A3TME Show

<u>Year</u>	<u>Square Feet of net Exhibit space</u>	<u>Total number of Exhibitors</u>	<u>Total Value of Equipment Exhibited</u>
1963	135,860	470	N.A.
1964	152,000	517	N.A.
1965	129,588	490	N.A.
1966	161,165	480	N.A.
1967	226,000	672	N.A.
1968	207,000	500 ⁽¹⁾	\$ 20 million ⁽¹⁾
1969	275,000	N.A.	N.A.

Source: Appendix 22.

N.A. - Not available.

(1) - Reported by Iron Age, April 18, 1968, p.126.

Table 26

Foreign Participation at ASTME Shows

	1968			1969		
	Space requested	Space rented	Cost of space rented	Space requested	Space rented	Cost of space rented
	Sq.ft.	Sq.ft.	\$	Sq.ft.	Sq.ft.	\$
U.K. British Machine Tool Trade Association	15,000	10,710	64,260	20,000	12,000	72,000
Canada: Dept. of Trade and Commerce of the Canadian Government	2,500	1,500	9,000	None	None	None
Italy: Italian Institute for Foreign Trade	5,000	3,000	18,000	4,000	4,000	24,000
Japan: Japan Machine Tool Trade Association	15,000	10,500	63,000	N.A.	N.A.	N.A.
Spain	None	None	None	10,000	4,000	24,000
Denmark	None	None	None	200	200	1,200
France	None	None	None	3,000	2,400	14,400

N.A. - Not available

In addition to the group exhibits, some foreign companies exhibit independently and others exhibit in conjunction with local distributors. At ASTME in 1968 this included companies from West Germany, Switzerland, Sweden, Belgium and elsewhere (Iron Age, April 13, 1968, p. 126); Czechoslovakia and Poland exhibited machine tool accessories; there were also individual exhibits from countries which had group exhibits. At the 1968 WESTEC show there were group exhibits from Japan, U.K., Australia, Italy, and Sweden. (Iron Age, March 21, 1968, p. 75).

In all, ASTME estimates that 18-20% of the floor space is taken by foreign machine tools. Most other observers estimate it as higher. Iron Age reports that foreign machine tools occupied over a third of the floor space at the 1968 WESTEC show. (Iron Age, March 21, 1968, p. 75).

At 1965 WESTEC, American Machinist reports there were "extensive displays by Japanese, Italian and Canadian machine builders, and one French Builder. Five Japanese makers showed a dozen machines at WESTEC". (American Machinist, March 15, 1968, p. 99). In 1966, 16 Japanese builders exhibited 38 machine tools, and in 1967, 28 exhibited 64. (Iron Age, June 1, 1967). According to Iron Age, Japanese manufacturers had 100 machine tools on display at the 1968 WESTEC show. (Iron Age, March 21, 1968, p. 75).

At WESTEC there were 56 machines displayed by 26 Italian machine tool builders. Canada has a 12-company combined exhibit including machine tools and other products.

(iv) Cost of Rental

Space rental at the 1968 and 1969 ASTME Expositions is \$ 6.00 per square foot, which includes:

- a. Standard booth equipment
- b. Standard booth sign
- c. Removal, storage, and return of crates
- d. General security
- e. Imprinter for visitor identification plates
- f. General promotional materials for exposition

Thus, rental space for an average size individual booth with space for two machines (15' x 30') is \$ 2,700. A moderate size official booth like the Italian or Spanish would be \$ 24,000, and a large one like the Japanese or British would be \$ 72,000. Total rentals for the exposition of foreign machines are over \$ 500,000.

5.4.2 Advertising in Trade Journals

The U.S. has a highly developed system of trade journals catering to the industrial market, and there are a large number directed at metalworking industries. U.S. machine tool manufacturers and foreign suppliers of machine tools advertise heavily in the metalworking journals. In the case of foreign advertisers, often the advertisements are sponsored by foreign trade associations. For example, the Japan Machine Tool Trade Association is a regular advertiser. Advertisements cost about \$500-\$1500 per page, depending on the Journal. In addition to the advertisements themselves, this also gives the goodwill of the journal editors, and advertisers can often expect to get the benefit of free news items or feature articles.

The major trade journal in metalworking is American Machinist which carries on a substantial programme of research on the machine tool market, including a census of the machine tool inventory every five years. American Machinist and Metalworking News are two of the major journals catering to the market for standard machine tools of the type produced in India. Other journals like Iron Age and Steel cater more to the primary metals industry and users of heavy equipment.

Apart from such specialised trade journals, machine tool suppliers in the U.S. do not advertise in the other media like newspapers, radio, television, etc which are used primarily by consumer products.

The following are the major journals:

American Machinist

McGraw-Hill Publishing Co.
330 West 42nd Street
New York, New York 10036
USA.

Modern Machine Shop

Iron Age

The Chilton Publishing Co
Chestnut & 56th Streets
Philadelphia, Pa 19139
USA.

Production

Machine and Tool Blue Book

Hitchcock Publishing Co.
Hitchcock Building
Wheaton, Illinois, 60187
USA.

Steel

Penton Publishing Co
Penton Building
Cleveland, Ohio 44113
USA.

Machinery

200, Madison Ave
New York, N.Y. 10016
USA.

Tool and Production

Metalworking News

A Fairchild Publication
7 East 12th Street
New York, New York, USA.

The Tool & Manufacturing Engineer
American Society of Tool &
Manufacturing Engineers
20501 Ford Road
Dearborn, Michigan 48128
USA.

Additional Information on Trade Journals

Additional information on trade journals, including full details on circulation and advertising rates, and on other advertising media can be obtained from the following publication.

Business Publications, Rates & Data
Standard Rate and Data Service, Inc.

McGraw - Hill Publishing Co. Inc
330 W. 42nd Street

New York, New York 10036 USA

(See Section 88, "Metal, Metalworking, Machinery")

Also, very extensive information on each magazine, including sample copies, advertising rates, and audited studies of their audiences can be obtained by airmail free of charge directly from the publication.

6. U.S. Exports of Machine Tools

6.1 Description of Recent Exports

Table 27 indicates that over the past four years, while imports of machine tools increased by 390%, exports of machine tools were stagnant.

Table 27

Exports of Machine Tools from the U.S.

Year	Units	Value (\$ million)	Surplus of Exports over Imports of Machine Tools (\$ million)
1964	14,110	198.6	162.2
1965	12,475	171.2	114.9
1966	14,634	173.2	55.5
1967	12,861	194.1	15.9

Source: Bureau of the Census, US Department of Commerce, Report FT 135 (Imports); Report M35W (Exports).

The stagnation of U.S. machine tool exports can be explained largely by the same factors that explain the success of imports.

- (a) Large home market and long delivery periods; making it less important for businessmen to look for overseas markets and harder for them to compete there.
- (b) Rising wages and high prices. It should be kept in mind that U.S. exporters do not receive any cash subsidies or tax rebates on exports.
- (c) Increase in ability of other countries to supply high quality sophisticated machine tools, in part because of foreign licensing and investment by U.S. Companies.
- (d) Increased marketing efforts by other countries.

Appendix 23 provides a breakdown of machine tool exports by type for 1965 through 1967. (Note that the 1967 statistics are for January through November only).

6.2 Export Organization

In light of the interest in India in developing consortia for the export of machine tools, it is interesting to examine American Machine Tool Export Associates (AMTEA), a consortium set up in 1945 and owned by twelve U.S. machine tool manufacturers and handling the export of machine tools by these companies, plus four associate companies, to Latin America only. Among the companies are Warner and Swasey, Kearney and Trecker, Lodge and Shipley, and Bullard. AMTEA get a commission on its sales, but no profit is made.

AMTEA handles sales and service through three channels:

Direct: The New York office maintains a good deal of control over the entire selling/service operation. It handles all orders going to the manufacturers, sets terms of payment, arranges financing, collects payments, and pays out commissions to its representatives. It sends men (including its President) on visits to customers or potential customers in Latin America.

AMTEA offices in Latin America: AMTEA has an office in Argentina with two of its own U.S. trained sales/service men. AMTEA is now looking for a person it can hire and send to Mexico to open an office. And AMTEA will spend a year training an engineer specializing in numerical control and send him to Latin America.

Local Representatives in each Latin American Country: AMTEA

has representatives in 15 countries working on commission. These representatives are independent of AMTEA and may handle other product lines not competitive with AMTEA's. They are responsible for both sales and service to the extent they are able to handle them, and some of their engineers have been trained in factories of AMTEA member companies, but AMTEA does not rely solely on them for either sales or service. Three problems with use of local representatives have been: (a) They are not aggressive enough in seeking orders; (b) Their resources are too limited to handle all servicing problems; and (c) They want to earn money quickly and dislike selling machines that have long delivery periods, since this delays their commissions. As a result, AMTEA has decided to send an AMTEA man to Mexico to take its business out of the hands of the local representative, who has not proved satisfactory.

AMTEA does not spend anything on advertising, and does not use direct mailings or take magazine ads. It does take part in U.S. Department of Commerce shows and will send a catalogue on request. Great stress is placed on personal contact in promoting sales; AMTEA men go personally to the potential customer. By contrast, AMTEA's biggest competitor, Cincinnati Milling, uses a large amount of advertising, but AMTEA points out that despite this and more men in Latin America, its sales are no higher than AMTEA's.

AMTEA places great stress on service as a selling point. If the local representative can't handle a servicing problem, AMTEA will send one of its own men. Unless the problem is due to the negligence of the customer, this service is free. In fact, no charge is made in 90% of its servicing.

Delivery for AMTEA machines is about 2 to 8 months in general. AMTEA's President pointed out that quick delivery is stressed by European and Japanese suppliers of standardized machine tools in Latin America.

AMTEA has no resources of its own to extend credit. However, it makes use of the U.S. Export-Import Bank to get credit for its customers, generally up to three years. Tied project aid from the U.S., which is available only for imports from the U.S., is a major factor in allowing AMTEA and other U.S. machine tool companies to export to Latin America.

AMTEA considers itself an exporter of high quality machine tools, including heavy-duty, sophisticated, and numerically controlled machine tools. The price range is from \$1,000 to \$150,000 per unit.

AMTEA sells primarily to Brazil, Argentina, and Mexico, which are the largest markets for machine tools in Latin America; Chile is fourth. Total annual AMTEA sales are normally about \$2.5 million. In 1967, sales were \$4 million, predominantly to Brazil.

AMTEA is a competitor in types of machine tools which account for about 30% of the total Latin American machine tool market. The primary users in this category are: (1) The large-scale industrial sector, e.g. automobiles, tractors, steel mills, heavy duty equipment, etc. and some makers of components and subcontractors; (2) Vocational training schools in universities, which buy high grade machine tools and combine their training programmes with commercial subcontracting carried out on the machines by the trainees.

The Latin American market for numerically controlled machine tools is just opening, and only Brazil, Mexico, and Argentina can be expected to have markets for them. So far, AMTEA has supplied about half a dozen.

Competing directly with AMTEA in the advanced machine tools it supplies are two New York firms and Cincinnati Milling Machine Company. Sales by Cincinnati Milling in Latin America are about the same as those of AMTEA, \$2.5 million annually. Also competing in standard machine tools are Japanese and European companies.

Japanese and European companies are also active in the lines not supplied by AMTEA, such as machines for the small scale sector. The machine tools they offer are lighter and less durable. Prices are also lower by some 30 - 50% compared to prices on U.S. exports, but some of this is explained by a difference in design and quality.

There is also local competition. Brazil has a large, good machine tool industry, and indigenous manufacturers are a major competitor in Brazil for standard machine tools. Moreover, the Brazilian market for these tools is protected by prohibitive tariffs and taxes. And through LAFTA, Brazil has preferential access to the machine tool markets of several other Latin American countries, including Argentina.

6.3 Assistance Provided to Exporters by the U.S. Government

6.3.1 Structure

Within the U.S. Government, the primary responsibility for promoting exports rests with the Domestic and International Business (DIB) unit of the Department of Commerce. These responsibilities are carried out by two sections of the DIB, namely:

The Bureau of International Commerce (BIC), which has primary responsibility for promoting exports and investment abroad through several offices:

- (a) The office of International Regional Economics, staffed by foreign trade and country specialists and organized on a geographical basis.
- (b) The office of Commercial and Financial Policy, dealing with foreign business practices, trade and commercial policy, transportation and insurance, and international finance.
- (c) The office of International Trade Promotion, which administers commercial intelligence, sample display centers, business information centers, mobile trade fairs, trade centers, trade fairs, and trade missions.

The Business and Defence Services Administration (BDSA)

which seeks to promote the interests of U.S. industry in any matter, including foreign trade, is organised into eight offices and 24 industry divisions and has a staff of approximately 200 industry and commodity specialists. One division, the Metalworking-Equipment Division, promotes the interests of the machine tool industry. In order to help exporters, the divisions of the BDSA collect information on international trade, trade barriers, foreign markets, and trade and investment opportunities relevant to their industry.

Outside the Department of Commerce, there is Government assistance to exporters through Export-Import Bank, which provides export credit, loan guarantees, and insurance.

6.3.2 Types of Assistance Provided

i) Commercial Intelligence

The U.S. Government has an impressive system of commercial intelligence to assist U.S. exporters.

Information Gathering: The primary regular source of foreign commercial information used by the Department of Commerce are:

- a) Reports of the Commercial Officers of the U.S. Foreign Service.

The Office of Foreign Commercial Services in the BIC administers the Commercial Officers of the U.S. Foreign Service (who are in the Department of State, although some twenty of them are actually officers in the Department of Commerce) stationed at U.S. Embassies and Consulates to collect and report trade information, which is sent to the BIC and BDSA for analysis. Under the comprehensive Economic Reporting Service, the Commercial Officers have a

specified list of information and data, which they are to report at regular intervals. In addition, they answer requests from the Department of Commerce for specific intelligence.

- b) Foreign economic and commercial periodicals and publications, including government statistical publications, taken by direct subscription or forwarded by overseas Commercial Officers.

In addition, information on market prospects are secured by:

- a) Trade missions sponsored by the Department of Commerce to meet with foreign businessmen and officials.
- b) Private consultants working under contract to conduct market surveys.

Information Dissemination: Commercial intelligence is made available through a number of channels:

- a) Both the BIC and BDSA put out a number of regular and special publications which are available by subscription or special order.

A convenient annotated "Semi-annual Checklist of International Business Publications" is published by the Department of Commerce, and among other things lists the following:

International Commerce: A weekly news magazine which is the principal Department of Commerce periodical dealing with international trade and investment. It reports developments relevant to international trade, opportunities for expansion of U.S. exports, and Department of Commerce activities in the field of trade promotion. It also has frequent special reports on market conditions in particular foreign economies (\$ 16 per year).

Overseas Business Reports discussing foreign trade regulations, recent economic developments, and marketing practices in individual foreign countries. A few of the reports deal with one particular goods in one foreign country. For example, "The Market for Machine Tools and

Related Equipment in Italy - 1965-67". (\$ 13 per year, for about 100 reports, or \$ 0.15 each).

Foreign Market Surveys, a series of 60 in-depth reports prepared by private overseas market research firms on the market for specific commodities in individual countries. For example, "Metal-cutting Machines in Malaya", "Metalworking Equipment in Thailand", and "Advanced Metalworking Equipment and Accessories in the Federal Republic of Germany". (\$ 3 each).

Export Market Guides providing a short description of the market for some product in a particular country, i.e. demand, competition, marketing system etc, as a background for participants in overseas exhibitions. For example, for the Machine Tool Exhibition in Singapore in 1965 the U.S. Department of Commerce prepared "Malaysia: Metalworking Machines and Equipment". (\$ 0.10 each).

Reports on the market for a wide variety of U.S. products in a particular foreign country, with description of economic conditions, distribution facilities etc. Some of these are published as supplements to International Commerce. (\$ 0.25 to 1.0 each).

Special reports of interest to exporters, for example on shipping, export procedures, electric current requirements around the world, lists of international trade fairs, and world trade in particular commodities. For example, "World Trade in Machine Tools, 1959-60" and "World Trade in Machine Tools, 1961-64". (\$ 0.30 each).

Reports of Trade Missions, usually covering markets for a wide range of U.S. products in one or a few countries.

International Customs Journals, prepared for each foreign country, listing tariff rates on imports (\$ 3.0 each).

Foreign Market Reports, reprints of airgrams received by the Department of Commerce from overseas Commercial Officers on subjects of interest to U.S. exporters. (\$ 1.50 each).

Trade Lists giving the names and addresses and details on size and operations of firms handling a specific commodity in one foreign country - agents, importers, distributors, exporters, manufacturers etc - to assist U.S. firms in finding customers, agents, distributors etc. For example, there are lists for "Machine Tools, Dies, Other Metalworking Machinery and Industrial Furnaces" and for "Metalworking Machinery and Equipment" for a large number of countries (\$ 1.0 each).

World Trade Directory Reports give basic commercial and financial data on specific foreign firms and individuals for use in evaluating business contacts. (\$ 2.0 each. If one does not already exist for a particular firm, it will be prepared).

Market Share Reports give a commodity breakdown for each of 69 importing countries and 747 items, showing the value of imports from each of 14 principal suppliers. One deals with machine tools for working metals. (\$ 1.50 each).

- b) The Office of Field Services under the DIB administers 42 Field Offices around the U.S., each representing all the sections of the Department of Commerce, including the BIC and BDSA, in its locality. The field offices will secure and provide commercial intelligence, including unpublished material on file at the Department of Commerce in Washington, D.C., when it is requested by firms interested in export. Also, in each Field Office area there is an export expansion council which holds conferences and seminars to provide information to businessmen.
- c) The Department of Commerce takes the initiative in supplying commercial intelligence on an individual basis to firms which have registered an interest in particular areas of export. Voluntarily supplied data on the export interests of these firms are stored in a computer and the Department of Commerce contacts the relevant firms when it learns of trade opportunities, foreign trade exhibitions, or other matters of relevance to the firms. Similarly, the Department of Commerce supplies this information to relevant trade associations, trade journals and other private publications.

- d) Certain types of information are also gathered and made available by special request upon payment of a service charge.

- ii) Export Sales Promotion

Beyond providing marketing information, the U.S. Department of Commerce sponsors and subsidises sales promotion activities for U.S. products in overseas markets:

- a) U.S. Trade Centers are permanent showrooms in London, Frankfurt, Stockholm, Milan, Tokyo and Bangkok manned by U.S. Department of Commerce officials. These undertake shows for various U.S. products. Each show is a week to 10 days long and features products of 20 - 40 suppliers. Between shows the showrooms are available to U.S. businessmen.
- b) U.S. Commercial Exhibitions are staged at major international trade fairs.

It should be noted that Trade Center shows and Commercial Exhibitions are undertaken when market research indicates sales potential, and each product show is preceded by a promotional campaign to attract buyers, agents etc. Also, exhibitors are provided with a market study for the country and products involved. Participation is subsidised; although the U.S. manufacturer pays freight to the foreign market, the Department of Commerce subsidises exhibition space and pays return freight on unsold goods.

- c) Business Information Centers manned by Department of Commerce officials are set up at trade fairs where there is not full-scale Department of Commerce participation.
- d) Mobile Trade Fairs, operated overseas by private U.S. businessmen, are subsidised by the Department of Commerce.
- e) Sample Display Centers operated and manned by Commercial Officers of U.S. Embassies provide showroom facilities for U.S. firms that wish to display products. These are available in Beirut, Manila, Nairobi and Bangkok.

iii) Business Delegations

Government-organised Trade Missions of U.S. businessmen, accompanied by Department of Commerce officials, travel abroad to meet businessmen and officials, establish business contacts, and present proposals for export, import, licensing and investment. They represent the entire U.S. business community, not their own companies. This is subsidised by the government.

The government also sponsors and assists industry trade missions which go abroad to conduct business for themselves, but these trips are at the participants' expense.

iv) Credit Guarantees and Insurance

The U.S. has a comprehensive system of export credit, guarantee and insurance operated by the Export-Import Bank, jointly with the Foreign Credit Insurance Association (an association of private insurance companies) in the case of insurance.

In addition, through its foreign aid programme the U.S. Government gives tied foreign loans which can be used only for purchases from the U.S. This is a significant factor in U.S. exports to developing countries, particularly of capital goods.

v) Subsidy of Export

Apart from the market information services, export promotion, and credit insurance, which all involve some element of subsidy, the U.S. does not subsidise exports. There are no cash subsidies and no tax rebates or credits.

Sales, Value Added, Employment, Capital Expenditure, and Machine Tools
held by U.S. Metalworking Industries

SIC	Industry	Sales, 1966 (in \$ 1000 millions)	Percent- tage	Value added by manufac- ture, 1965 (in \$ 1,000 millions)	Percent- tage	Employment in plant Employing 20 or more, 1967 (in 1000)	Percent- tage	Capital Expenditure 1965 (in \$ millions)	Percent- tage	Total Machine tools 1968 (in 1000)	Percent- tage
19	Ordinance and accessories	NA	NA	3.1	2.66	293	3.27	94	1.25	42	1.4
25	Metal furniture	NA	NA	1.5	1.29	137	1.53	58	0.77	50	1.8
33	Primary metals	45.7	18.75	18.8	16.11	1,325	14.76	2,274	30.18	167	5.8
34	Fabricated metal products	26.0	10.67	14.2	12.17	1,248	13.91	805	10.68	656	22.9
35	Machinery except electrical	40.2	16.50	22.8	19.54	1,743	19.43	1,224	16.24	913	31.8
36	Electrical machinery and equipment	39.9	16.37	20.2	17.31	1,750	19.28	1,036	13.75	398	13.9
37	Transportation equipment	73.5	30.16	27.7	23.74	1,935	21.56	1,670	22.16	364	12.7
38	Instruments, photo equip- ment, clocks	9.8	4.02	5.1	4.37	343	3.83	233	3.09	133	4.6
39	Miscellaneous manufac- turing industries (Metal)	NA	NA	3.3	2.83	217	2.42	143	1.90	147	5.1
19, 25, 39 Combined		8.7	3.57	-	-	-	-	-	-	-	-
TOTAL	..	243.7	100	116.7	100	8,972	100	7,536	100	2,870	100

Note: NA = Not available. Source: Value added and capital expenditures - 1965 Annual Survey of Manufactures.
Employment - Iron Age Metalworking Marketguide, Vol. 3, 1967
Machine Tools - Tenth American Machinist Inventory of Metalworking Equipment, 1968

Number of Plants and Employment in the U.S. Metalworking Industries, by Industry 1967

Standard Indus- trial Code	I n d u s t r y	Total Employment in plants employing 20 or more	Percent employing 20 or more	Total Plants employing 20 or more	Number of Plants by employment size	Other Plants Making this Product
					20 to 99 100 to 499 500 ore more	
19	Ordinance and accessories	293,293	3.3	159	31 45 83	82
25	Metal furniture	137,434	1.5	845	451 334 60	300
33	Primary metals	1,324,671	14.8	3,447	1,635 1,310 502	722
34	Fabricated metal products	1,248,268	13.9	9,549	6,417 2,711 421	2,847
35	Machinery except electrical	1,742,884	19.4	8,997	5,797 2,479 721	2,895
36	Electrical machinery and equipment	1,729,735	19.3	4,193	1,757 1,672 764	1,034
37	Transportation equipment	1,934,638	21.6	2,587	1,226 842 519	667
38	Instruments, photo equip- ment, clocks	343,369	3.8	1,074	478 433 165	471
39	Miscellaneous manufacturing industries (metal)	217,455	2.4	1,431	850 482 99	311
	U.S. Total	8,971,747	100	32,282	18,642 10,308 3,332	9,529

Source: Iron Age, Metalworking Market, Vol. 2

State Distribution of U.S. Metalworking Plants
and Employment, 1967

<u>State</u>	<u>Total Employment in plants employing 20 or more</u>	<u>Percent</u>	<u>Total Plants employing 20 or more</u>	<u>Number of Plants by employment size</u>		
				<u>20 to 99</u>	<u>100 to 499</u>	<u>500 or more</u>
Alabama	87,179	.97	315	150	124	41
Alaska	-	-	-	-	-	-
Arizona	61,022	.68	103	53	30	20
Arkansas	29,431	.33	142	62	61	19
California	900,529	10.04	3,047	1,897	900	250
Colorado	46,531	.52	189	111	61	17
Connecticut	324,541	3.62	1,144	659	350	135
Delaware	16,772	.19	50	28	17	5
Dist. of Columbia	2,085	.02	24	18	6	-
Florida	86,577	.97	502	335	140	27
Georgia	87,019	.97	332	187	114	31
Hawaii	518	.01	6	3	3	-
Idaho	4,771	.05	33	22	9	2
Illinois	804,922	8.97	3,037	1,696	1,007	334
Indiana	462,802	5.16	1,251	650	427	174
Iowa	107,760	1.20	381	202	136	43
Kansas	69,446	.77	260	156	90	14
Kentucky	86,853	.97	266	126	105	35
Louisiana	39,353	.44	171	106	50	15
Maine	13,439	.15	77	51	20	6
Maryland	133,416	1.49	352	192	120	40
Massachusetts	339,908	3.79	1,429	869	413	147
Michigan	795,066	8.86	2,748	1,719	782	247
Minnesota	129,244	1.44	597	349	197	51
Mississippi	40,066	.45	148	65	61	22
Missouri	207,556	2.31	755	472	221	62
Montana	5,530	.06	15	10	2	3
Nebraska	26,575	.30	121	67	42	12
Nevada	4,315	.05	9	3	2	4
New Hampshire	38,810	.43	129	68	43	18
New Jersey	383,037	4.27	1,784	1,083	559	142

Appendix 3 (Cont'd)

State	Total Employment in plants employing 20 or more	Percent	Total Plants employing 20 or more	Number of Plants by employment size		
				20 to 99	100 to 499	500 or more
New Mexico	6,218	.07	21	11	7	3
New York	758,720	8.46	3,184	1,957	957	270
North Carolina	71,893	.80	336	189	111	36
North Dakota	1,154	.01	11	7	4	-
Ohio	876,729	9.77	2,886	1,547	965	374
Oklahoma	54,231	.60	229	124	88	17
Oregon	56,009	.40	207	136	56	15
Pennsylvania	777,333	8.66	2,387	1,251	849	287
Rhode Island	59,534	.66	357	223	104	30
South Carolina	36,209	.40	121	54	48	19
South Dakota	1,585	.02	18	13	92	-
Tennessee	97,115	1.08	378	197	126	55
Texas	228,546	2.55	913	526	304	83
Utah	29,311	.33	71	39	22	10
Vermont	14,517	.16	49	19	23	7
Virginia	88,211	.98	222	96	92	34
Washington	142,372	1.59	280	185	67	28
West Virginia	46,646	.52	140	71	50	19
Wisconsin	309,996	3.46	1,044	578	337	129
Wyoming	545	.01	11	10	1	-
U.S. TOTAL	8,971,747	100	32,282	18,642	10,308	3,332

Note : Metalworking is defined as SIC 19, 25, 33 - 38, and 39 (metal only)
Source : Iron Age, Metalworking Market Guide, Vol. 3

Regional Distribution of Machine Tools in the U.S., 1968

Area	Machine Tools, Total (<u>'000</u>)	Percent of total machines <u>in each area</u>	Machine Tools under <u>10 years</u> (<u>'000</u>)	% of machine Tools under 10 years in <u>each area</u>
1. Massachusetts, Rhode Island, Vermont, New Hamp- shire, & Maine	178	6.2	64	6.3
2. Connecticut	127	4.4	44	4.3
3. Eastern New York, northern New Jersey	300	10.5	116	11.4
4. Western New York	110	3.8	38	3.7
5. Eastern Pennsylvania, southern New Jersey, and Delaware	157	5.5	56	5.5
6. Western Pennsylvania, east-central Ohio, West Virginia	93	3.3	30	2.9
7. Maryland	33	1.2	12	1.1
8. Virginia, North Carolina, South Carolina	55	1.9	19	1.9
9. Central and east Tennessee, Georgia, Alabama, Missi- ssippi, Louisiana, Florida	134	4.7	47	4.5
10. North-east Ohio	146	5.1	50	4.9
11. North-west Ohio	34	1.2	11	1.1

Appendix 4 (Cont'd)

Area	Machine Tools, Total (¹ 000)	Percent of total in machines each area	Machine Tools under 10 years (¹ 000)	% of machine Tools under 10 years in each area
12. South Ohio and east Kentucky	100	3.5	34	3.3
13. East Michigan	210	7.3	76	7.4
14. Indiana, except north-west	88	3.0	30	2.9
15. Northern Illinois north-west Indiana, west Michigan and Iowa	380	13.2	133	13.0
16. South Wisconsin	99	3.5	33	3.2
17. Minnesota, north Wisconsin, and north Michigan	47	1.7	17	1.7
18. South Illinois, west Kentucky, west Tennessee, east Missouri, Arkansas	78	2.7	26	2.6
19. West Missouri Kansas, Oklahoma	58	2.0	21	2.0
20. Texas, New Mexico	77	2.7	27	4.7
21. North Dakota, South Dakota, Nebraska, Montana, Wyoming, Colorado, Utah, Idaho	36	1.2	12	1.2
22. Washington and Oregon	43	1.5	15	1.5

Appendix 4 (cont'd)

Area	Machine Tools, Total <u>('000)</u>	Percent of total in machines <u>each area</u>	Machine Tools under <u>10 years</u> <u>('000)</u>	% of machine Tools under 10 years in <u>each area</u>
23. North California and north Nevada	56	1.9	21	2.0
24. South California, south Nevada, and Arizona	231	8.0	88	8.7
Total	<u>2,870</u>	<u>100</u>	<u>1,022</u>	<u>100</u>

Source: Tenth American Machinist Inventory of Metalworking Equipment 1968.

U.S. Market : Inventory : Boring Machines

	Number of machines				
	1963 Inventory		1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years
Boring Machines :					NC
Horiz. bore-drill-mill:					
Table & planer type					
Floor type	24,072	8,999	6,294	12,616	4,281
				5,265	1,559
Precision, horizontal & vertical	14,421	6,034	1,777	17,168	3,261
Jig borers, horizontal and vertical	11,860	6,688	1,214	13,628	1,917
Other (except vertical boring mills, turret lathes, boring lathes)	1,669	602	467	2,204	652
Total	52,022	21,423	9,752	50,882	11,670
					1,728

Appendix 5 (cont'd)

U.S. Market : Inventory : Broaching Machines

	Number of machines					
	1963 Inventory			1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years
Broaching Machines:						
1963:						
Horizontal internal or comb (incl surface) hyd	5,058	1,366	1,362			
Vertical internal hydraulic	3,271	1,094	507			
Vertical surface, hydraulic (incl comb)	3,000	1,085	415			
Rotary surface, hydraulic	237	110	34			
Mechanical drive (horiz. & vert incl surface)	1,432	299	634			
Other	1,085	451	226			
1968:						
Internal				8,144	1,804	3,710
Surface				4,567	1,237	693
Other				1,261	559	213
Total	14,083	4,405	3,178	13,972	3,660	3,646

* fewer than 10 units

U.S. Market : Inventory : Cutoff & Sawing Machines

	Number of machines					
	1963 Inventory			1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years
Contour Sawing & Filing Machines	24,378	10,022	2,661	24,883	8,052	4,324 *
Cutoff & Sawing Machines:						
Hacksaw	37,362	12,083	7,026	38,556	12,785	9,322 *
Circular saw	24,410	12,717	2,152	28,435	13,735	4,376 *
Abasive cutting	19,541	10,192	1,558	29,048	14,895	2,771 *
Bandsaw	59,924	28,950	5,353	71,932	31,647	8,964 *
Other (incl friction)	6,426	3,165	983	6,627	3,261	1,032 *
Total ..	<u>172,041</u>	<u>77,129</u>	<u>19,733</u>	<u>199,481</u>	<u>84,375</u>	<u>30,789</u>

* fewer than 10 units

U.S. Market : Inventory : Drilling Machines

	Number of machines						
	1963 Inventory			1968 Inventory			NC
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years	
Drilling Machines:							
Sensitive, bench	64,090	28,245	7,771	54,519	21,381	9,799	17
Sensitive, floor & pedestal	58,465	21,571	9,206	60,859	20,591	13,593	181
Upright: Single spindle	173,560	53,011	29,947	169,272	55,434	38,730	1,562
Gang	46,620	15,092	10,328	44,331	11,577	12,742	157
Turret (fixed column & table)	5,881	4,283	319	8,988	6,254	558	559
Radial	46,216	12,793	13,146	44,995	10,648	16,168	70
Multi-spindle cluster (adj & fixed center)	23,520	8,939	4,847	22,193	8,360	5,301	217
Deep hole (incl gun drills)	3,888	2,234	521	5,606	3,312	721	80
Other (except unit head & way)	14,572	5,845	3,020	9,523	5,132	1,723	378
Total ..	<u>436,813</u>	<u>162,013</u>	<u>79,105</u>	<u>420,286</u>	<u>142,689</u>	<u>99,335</u>	<u>3,221</u>

Appendix 5 (cont'd)

U.S. Market : Inventory : Gear Cutting, Hobbing & Finishing machines

	Number of machines					
	1963 Inventory			1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years NC
Gear Cutting and Finishing Machines:						
Gear hobbing machines	20,298	5,581	4,944	15,353	4,177	4,778 *
Gear shapers	10,560	2,713	2,708	7,646	1,485	2,611 16
Form milling type (spur & bevel)	2,356	293	1,344	2,701	870	1,114 *
Bevel gear cutters (not incl planer type)	5,418	1,479	990)	3,685	1,091	1,136 *
Planer type	544	76	280)			
Gear tooth finishers (grind, lap, shave etc)	6,155	2,150	1,020	4,180	1,245	1,045 *
Other	1,190	413	251	1,049	303	396 *
Total	46,521	12,705	11,537	34,614	9,171	11,080 22

* fewer than 10 units.

U.S. Market : Inventory : Grinding Machines

Number of machines

	1963 Inventory		1968 Inventory		NC
	Total	Under 10 years	Under 10 years	Over 20 years	
External:					
Cylindrical, exc centreless					
Plain center type)			28,950	7,469	8,581 *
Universal center type)	44,120	12,348	15,208	4,906	3,913 *
Chucking			3,894	1,168	1,106 *
Centerless incl shoe type	17,427	6,008	15,854	5,013	3,692 *
Internal:					
Cylindrical, chucking,					
shoe type, exc centerless	19,378	5,696	15,638	4,305	4,629 *
Centreless	3,239	1,248			
Surface: Rotary Table:					
Vertical	19,976	7,324	12,261	4,385	2,685 *
Horizontal			14,324	5,073	3,170 *
Reciprocating or Travelling Column:					
Vertical	53,340	21,935	13,455	6,092	2,404 *
Horizontal	27,379	14,322	50,434	20,927	9,182 *
Abrasive belt			57,065	27,472	5,903 *
Contour grinders	5,593	2,635	5,342	1,880	884 *
Disk	27,062	13,415	55,728	33,464	5,476 *
Thread	5,712	1,416	4,964	3,975	2,249 *
Tool & cutter	58,340	19,523	62,431	21,205	15,440 *
Bench, floor & snag	114,144	38,008	99,511	30,208	24,826 *
Other: Except gear including jig	27,234	7,790			
Total	422,944	151,668	471,539	181,559	27,358
Total					96,498

* fewer than 10 units

U.S. Market : Inventory : Honing and Lapping

Number of machines

	1963 Inventory			1968 Inventory			NC
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years	
Honing and Lapping Machines:							
Honing : Internal (incl comb bore hone)	14,774	7,373	1,158	16,926	8,179	2,076	*
External	1,170	703	46	1,675	891	96	*
Lapping: Flat surface	5,210	2,773	557	5,777	3,346	654	*
Cylindrical	2,822	1,083	487	3,353	1,003	569	*
Other (incl comb hone-lap)	2,779	1,009	874	3,915	1,520	977	*
Total ..	26,755	12,941	3,122	31,646	14,939	4,372	*

* fewer than 10 units

Appendix 5 (cont'd)

U.S. Market : Inventory : Lathes

	Number of machines				
	1963 Inventory		1968 Inventory		
	Total	Under 10 years	Total	Under 10 years	Over 20 years NC
Lathes:					
Bench Lathes	52,640	19,477	56,272	17,711	11,617 27
Engine:					
Standard heavy duty	58,581	14,119	59,488	9,341	11,961 296
Standard light & med duty)		20,270	88,866	28,939	21,758 191
Toolroom light & med duty)	85,596	31,820			
Toolroom heavy duty	26,596	10,416	44,770	18,687	8,391 28
Mfg & gap	6,744	2,170	5,166	2,207	1,409 *
Tracer	6,393	4,311	10,249	6,478	417 44
Turret lathes: Ram type (capstan)	57,083	15,127	47,137	10,860	15,550 66
Saddle type	29,777	6,865	30,555	6,540	11,534 159
Automatic chucking, vertical and horizontal:					
Single spindle	22,721	8,413	11,994	8,538	2,364 556
Multi-spindle			8,288	2,551	2,075 20
Automatic, between centres chucking	7,046	1,139	4,807	1,358	1,226 36
Automatic bar (screw) machines, single spindle	51,391	18,623	46,627	15,534	11,961 200
Automatic bar machines, multi-spindle	24,418	7,851	25,432	8,046	6,999 26
Vertical turning & boring mills (VTI, VBM)	22,378	5,300	19,557	3,255	8,192 333
Other (incl boring, axle, spinning, shell)	6,913	2,186	13,803	3,702	4,480 48
Total	458,277	148,147	456,011	143,737	126,934 2,033

* fewer than 10 units.

Appendix 5 (cont'd)

U.S. Market : Inventory : Milling Machines

	Number of Machines				
	1963 Inventory		1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years Over 20 years NC
Milling Machines:					
Bench (hand & power feed)	15,249	6,130	2,596	17,697	6,973 3,439 *
Hand	20,731	5,249	6,032	18,911	5,571 5,201 *
Ram type (swivel head & turret) - only vertical in 1968	12,175	7,611	962	54,311	33,859 3,817 586
Knee type:					
Horizontal (plain & univ)	70,402	20,316	18,599	@	@ @ @
Vertical	54,191	29,546	6,142	@	@ @ @
Automatic & manufacturing	10,047	1,837	2,572	@	@ @ @
Bed type (incl rise & fall)	15,822	4,364	3,814	@	@ @ @
Gen purpose, knee or bed:					
Horizontal (plain, univ, ram)	@	@	@	71,115	19,143 22,501 278
Vertical	@	@	@	42,156	19,494 7,460 377
Manufacturing, knee or bed	@	@	@	22,986	6,908 5,986 132
Planer type	4,169	958	1,672	4,836.	1,107 1,885 18
Profiling & duplicating (incl skin & spar)	10,869	4,684	1,910	18,973	7,954 2,219 855
Die sinking	2,674	1,086	513		
Thread millers	4,300	556	1,598	4,097	497 1,955 10
Other (incl spline, router, engraving)	9,689	3,699	2,630	10,008	4,366 1,771 89
Total ..	230,318	86,086	49,000	265,090	105,872 56,234 2,356

* fewer than 10 units
 @ Not broken down into these headings.

Appendix 5 (cont'd)

U.S. Market : Inventory : Planers, Shapers, Slotters

Number of machines

	1963 Inventory			1968 Inventory			NC
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years	
Planers:							
Double housing/column	8,326	538	5,341	5,746	135	4,228	*
Openside and other	5,641	1,015	2,551	3,182	325	1,481	*
Shapers:							
Horizontal (except gear)	30,671	4,960	12,432	23,790	2,008	11,905	*
Vertical (incl slotters, key seats)	5,794	1,059	2,457	6,503	1,201	3,017	*
Total ..	<u>50,432</u>	<u>6,572</u>	<u>22,781</u>	<u>39,221</u>	<u>3,719</u>	<u>20,631</u>	<u>*</u>

* fewer than 10 units.

U.S. Market : Inventory : Polishing and Buffing Machines

Number of machines

	1963 Inventory			1968 Inventory			NC
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years	
Polishing & Buffing Machines:							
Polishing stands (bench and floor)	52,553	17,877	9,665	53,783	18,668	9,625	*
Abrasive-belt disk, drum (not grind)	29,442	13,168	2,793	32,212	14,318	3,277	*
Other (incl speed lathes)	13,374	4,541	2,855	9,476	3,777	1,900	*
Total ..	<u>95,369</u>	<u>35,586</u>	<u>15,313</u>	<u>95,471</u>	<u>36,763</u>	<u>14,802</u>	

* fewer than 10 units

Appendix 5 (cont'd)

U.S. Market : Inventory : Tapping Machines

Number of machines

	<u>1963 Inventory</u>		<u>1968 Inventory</u>	
	<u>Total</u>	<u>Under 10 years</u>	<u>Total</u>	<u>Under 10 years</u>
Tapping machines	<u>Over 20 years</u>		<u>Over 20 years</u>	
				<u>NC</u>
	29,441	11,931	4,320	34,079
			14,200	6,124
				10

Appendix 5 (cont'd)

U.S. Market : Inventory : Threading Machines

Number of machines

	1963 Inventory			1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years
Threading Machines (not incl mill, grind roll)	16,234	4,625	4,829	15,235	4,416	4,894
						*

U.S. Market : Inventory : Multi-Function Machines (not elsewhere classified)

	Number of machines				
	1963 Inventory		1968 inventory		NC
	Total	Under 10 years	Under 10 years	Over 20 years	
Multi-Function Machines:					
Drill-mill-bore, manual tool change, vert & horizontal	③	4,369	3,140	268	1,761
Drill-mill-bore, indexing turret, vert & horizontal	③	1,920	1,361	135	744
Drill-mill-bore, automatic tool change:					
Vertical	③	891	803	20	718
Horizontal	③	987	944	*	922
Total	..	8,167	6,248	432	4,145

* fewer than 10 units
 ③ Not included separately

Appendix 5 (cont'd)

U.S. Market : Inventory : Special Way Type Machines

	Number of machines					
	1963 Inventory			1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years
Special Way-Type Machines:						
Single station (several operations on one part)	5,361	2,514	1,025	3,171	1,736	407
Multi-station, rotary-type	4,968	3,275	257	5,055	3,148	319
Multi-station, center-column type	2,807	1,125	526	973	598	64
Multi-station, trunnion type	740	442	45	645	246	43
Multi-station, transfer (plain or pallet)	1,261	955	27	2,432	1,519	34
Automatic assembly machines (all types)	5,538	4,421	240	13,407	9,668	503
Total ..	20,675	12,732	2,120	25,683	16,915	1,370
						108

* fewer than 10 units

U.S. Market : Inventory : Electro-Erosion Machines

	Number of machines					
	1963 Inventory		1968 Inventory			
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years
Electro-Erosion Machines:						
Electrical-discharge machines	2,318	1,937	41	6,250	5,428	44
Electro-chemical machines				887	637	10
Electrolytic machines:	710	639	-			
Grinders				751	499	-
Ultrasonic cutting machines	548	522	-	444	365	-
Total	3,576	3,098	41	8,332	6,929	54

* fewer than 10 units

Appendix 5 (cont'd)

U.S. Market : Inventory : Bending and Forming Machines

	Number of machines					
	1963 Inventory			1968 Inventory		
	Total	Under 10 years	Over 20 years	Total	Under 10 years	Over 20 years
Bending and Forming Machines - Power:						
Bending rolls, sheet and plate	20,615	6,653	5,133	19,025	5,374	5,065 *
Bending rolls, bars, shapes, pipe	7,962	3,158	1,256	9,087	2,889	1,959 21
Bending brakes & folders (exc. press brakes)	15,924	6,135	2,518	15,972	4,929	3,528 11
Press brakes	34,251	15,395	3,965	38,921	16,117	6,231 *
Rotary bending and forming machines	14,607	7,334	1,876	11,569	4,783	2,083 *
Total ..	<u>93,359</u>	<u>38,675</u>	<u>14,748</u>	<u>94,574</u>	<u>34,092</u>	<u>18,866</u> 42

* fewer than 10 units.

U.S. Market : Inventory : Presses

	Number of machines						
	1963 Inventory		1968 Inventory		NC		
	Total	Under 10 years	Total	Under 10 years			
Over 20 years	Over 20 years	Over 20 years	Over 20 years				
<u>Hydraulic Presses:</u>							
Vertical, single action	38,837	18,247	5,683	45,563	17,627	7,906	*
Vertical, double and triple action	4,914	2,170	874	5,944	2,802	637	*
Horz, single action (incl extruders)	3,952	1,637	996	4,246	1,379	1,207	*
Pneumatic presses (exc hydro-pneumatic)	8,644	5,252	898	10,300	5,613	741	*
Other (incl.stretch, flexible-die, hydro-pneumatic)	4,823	2,764	322	3,789	1,952	524	*
Sub-total	61,170	30,070	8,773	69,842	29,373	11,015	
<u>Mechanical Presses - Power (exc forging) @</u>							
Inclinable, single action (OBI)	152,701	46,859	33,511	178,833	50,301	48,596	*
Gap or C-frame+	38,669	11,779	13,248	43,421	14,089	14,538	*
Straight side:							
Single action (incl arch)	59,132	15,916	19,657	41,151	9,125	14,811	*
Double & triple action+				6,173	1,515	2,059	*
Knuckle joint (embossing)%				2,092	468	817	*
Vertical, double & triple action**	7,299	2,328					*

U.S. Market : Inventory : Presses (continued)

Number of machines

	1963 Inventory		1968 Inventory		NC
	Under 10 years	Over 20 years	Under 10 years	Over 20 years	
	Total		Total		
<u>Mechanical Presses - Power</u>					
<u>(exc forging) @ (cont'd)</u>					
Adjustable bed and honing+	12,283	2,692	4,199	6,505	*
Rotary die (dial type)	2,055	679	372	2,744	*
Pull-down punching & stamping (dieing machines)	4,225	1,386	862	5,729	*
Multiple transfer, automatic	2,720	1,065	769	2,843	*
Multiple plunger (incl eyeletting)	3,127	1,723	646	3,611	*
Horizontal (incl bulldozers)	5,545	431	2,040	1,533	*
Sub-total	287,756	84,858	77,518	294,640	
<u>High Energy-Rate Forming</u>					
<u>Presses @</u>					
				299	
				250	
Grand Total	348,926	114,928	86,291	364,781	
				112,171	
				99,180	

* fewer than 10 units

% 1963 data under Gap or C-frame, straight-side single action or adjustable bed and honing

@ 1963 data include forging presses

+ 1963 for double and triple action included in "Vertical, double and triple action"

** 1968 data included in "Gap or C-Frame", "Straight side: Double or triple action" or "Adjustable bed & honing".

U.S. Market : Inventory : Punching & Shearing Machines

Number of machines

	1963 Inventory		1968 Inventory		NC
	Under	Over	Under	Over	
Total	10 years	20 years	10 years	20 years	
Fixed position Two axis positioning table	18,777	5,779	5,719	5,967	19
			3,054	507	371
Plate and sheet shears	32,294	6,792	11,258	8,215	10
Bar and angle shears	7,566	2,577	2,414	2,531	*
Rotary shears (incl slitters)	7,992	2,412	1,683	1,983	*
Combination machines (punch, shear, cropper)	6,499	1,764	2,375	1,772	*
Other (incl sprue cutters, nibblers)	6,377	1,202	2,488	1,090	*
Total ..	79,505	20,526	27,614	22,065	404

* fewer than 10 units

Source: 1963: The Ninth American Machinist Inventory of Metalworking Equipment, 1963
1968: The Tenth American Machinist Inventory of Metalworking Equipment, 1968.

Machine Tools Installed in U.S. Metalworking Industries, 1963

Industry	Total machine tools			Metalcutting machines			Metalforming machines			% of total equipment in per 100 employees
	Total Units	Under 10 Yrs	Over 20 Yrs	Total Units	Under 10 Yrs	Over 20 Yrs	Total Units	Under 10 Yrs	Over 20 Yrs	
Ordinance and Accessor-	41,565	28%	13%	331	33%	14%	7,566	37%	8%	18.4
ries										
Metal Furniture and	50,337	31%	23%	*	23,221	35%	27,116	29%	25%	35.0
Fixtures										
Primary Metals	167,329	29%	31%	198	129,041	30%	38,285	27%	35%	12.5
Industries										
Fabricated Metal	656,052	35%	22%	992	407,244	37%	243,808	33%	24%	44.8
Products										
Cutlery, hand tools,	83,688	30	28	82	53,937	30	29,751	29	26	47.0
hardware										
Heating, plumbing	31,692	23	35	*	23,356	21	8,336	26	33	33.8
fixtures										
Fab. structural	204,813	38	20	426	110,652	42	94,166	34	21	41.6
products										
Screw-machine	101,072	37	20	*	78,424	37	22,648	35	25	90.4
products										
Metal stampings	79,459	35	22	63	35,764	39	43,695	33	26	41.2
Miscellaneous fab.	155,323	36	22	410	105,111	37	50,212	36	24	39.4
metal products										

Appendix 6

Industry	Total machine tools			Metalcutting machines			Metalforming machines			% of total equipment in each industry	Machines per 100 employees			
	Total Units	Under 10 Yrs	Over 20 Yrs	Total Units	Under 10 Yrs	Over 20 Yrs	Total Units	Under 10 Yrs	Over 20 Yrs					
Machinery except electrical	912,541	36%	26%	6,834	801,418	37%	25%	6,727	111,123	29%	30%	107	31.8	42.4
Engines and turbines	32,560	32	30	400	30,236	32	31	400	2,324	34	20	*	1.1	26.4
Farm machinery and equipment	45,474	22	41	48	32,772	22	39	44	12,702	20	45	*	1.6	33.3
Construction, mining, material handling	84,994	30	30	727	71,830	30	29	719	13,164	26	33	*	3.0	28.4
Metalworking machinery	248,721	39	23	1,792	231,182	40	23	1,778	17,539	32	24	14	8.7	64.0
Special-industry machinery	120,920	32	31	1,297	107,992	32	31	1,281	19,929	26	34	15	4.2	43.7
General industrial equipment	126,036	33	28	626	111,657	33	28	626	14,379	32	30	*	4.4	37.1
Office machines	32,632	40	26	301	26,212	40	24	289	6,420	37	32	12	1.1	13.1
Service-industry machinery	48,596	29	25	120	32,174	30	25	85	16,422	25	25	35	1.7	27.3
Miscellaneous machinery except electrical	172,608	44	18	1,524	157,363	45	18	1,505	15,245	35	23	19	6.0	91.1
Electrical machinery and equipment	398,252	42	18	2,467	278,618	44	16	2,234	119,634	37	23	183	13.9	19.3
Electrical equipment	211,049	39	21	962	148,025	39	21	879	63,024	33	22	81	7.3	26.9

Industry	Total machine tools			Metalcutting machines			Metalforming machines			Machines per 100 employees	
	Total Units	Under 10 Yrs	Over 20 Yrs	Total Units	Under 10 Yrs	Over 20 Yrs	Total Units	Under 10 Yrs	Over 20 Yrs	% of total equipment in each industry	Machines per 100 employees
Household appliances	27,845	27	28	*	16,617	26	29	11,223	29	26	1.0
Communications, electronic equipment	159,353	48	12	1,505	113,976	52	7	1,404	45,382	38	101
Transportation equipment	363,950	32	24	2,713	300,811	32	23	2,685	63,132	30	28
Complete motor vehicles	42,989	35	22	52	27,756	37	22	50	15,233	31	24
Automotive parts, accessories	124,413	32	26	132	101,908	32	27	127	22,510	34	26
Complete aircraft	31,075	36	22	326	23,743	37	22	326	7,332	33	22
Aircraft engines and parts	134,015	31	18	2,182	122,972	31	18	2,169	11,043	29	19
Ships, boats, rail-road equipment	31,453	25	40	21	24,432	28	35	13	7,021	14	57
Precision instruments	132,732	40	17	363	107,730	41	17	348	25,022	37	18
Miscellaneous manufacturing industries	147,033	35	27	85	93,227	37	22	66	53,806	30	36
TOTAL ..	2,869,798	36%	23%	14,190	2,375,309	37%	22%	13,698	694,479	32%	26%
											492
											100.0%
											28.7

* less than 10 units

Source: Tenth American Machinist Inventory of Metalworking Equipment, 1969

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Appendix 8

Source: U.S. Department of Commerce, Business Economics, Business Statistics, 1967, Washington D.C., 1967

Part I

U.S. MARKET : PRODUCTION (shipments including export) : METALWORKING MACHINE TOOLS

	1964			1965		
	Number	Value (U.S.\$'000)	Average value (\$)	Number	Value (U.S.\$'000)	Average value (\$)
<u>METALWORKING MACHINERY,</u>						
<u>TOTAL</u>	<u>212,257</u>	<u>1,209,076</u>	<u>5,696</u>	<u>250,492</u>	<u>1,457,685</u>	<u>5,819</u>
Average value under \$ 1,000	131,237	32,431	247	157,142	39,391	251
Average value \$ 1,000 or over	81,020	1,176,645	14,523	93,275	1,416,906	15,190
<u>METAL-CUTTING TYPE, TOTAL</u>	<u>153,831</u>	<u>874,467</u>	<u>5,685</u>	<u>184,168</u>	<u>1,047,823</u>	<u>56,895</u>
Average value under \$ 1,000	95,117	22,075	232	116,163	26,492	228
Average value \$ 1,000 or over	58,714	852,392	14,518	68,005	1,021,331	15,018

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : BORING MACHINES

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
<u>BORING MACHINES, TOTAL</u>	<u>1,718</u>	<u>74,056</u>	<u>1,823</u>	<u>91,882</u>
Horizontal boring, drilling and milling machines:				<u>50,402</u>
Table type	214	18,106	221	19,582
Floor type (including rail mounted)	41	5,923		88,606
Rotary table type and all other	33	5,174		
Vertical boring and turning mills (including vertical turret lathes)	109	11,726	192	27,385
Precision boring machines:				142,650
Horizontal:				
Bridge type	243	7,241		
Way type	46	1,722		
All other precision boring machines (including vertical type)	136	4,880	551	20,714
Jig boring machines	461	17,553		37,593
All other boring machines	435	1,731	513	22,365
			546	1,836
				43,596
				53,064

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : DRILLING MACHINES

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>DRILLING MACHINES, TOTAL</u>	<u>26,222</u>	<u>72,264</u>	<u>2,756</u>	<u>31,400</u>	<u>83,185</u>	<u>2,649</u>
Average value under \$ 1,000	21,469	4,177	195	25,987	5,074	195
Average value \$ 1,000 or over	4,753	68,087	14,325	5,413	78,111	14,430
Sensitive drilling machines:						
Bench type:						
Average value under \$ 1,000	5,167	927	179	1,240	392	3,161
Average value \$ 1,000 or over	70	209	2,986	86	215	2,500
Floor and pedestal type:						
Average value under \$ 1,000	8,662	5,283	610	11,190	5,889	526
Average value \$ 1,000 or over						
Vertical (upright) drill- ing machines:						
Plain-upright:						
Average value under \$ 1,000	8,648	8,133	940	14,215	10,165	715
Average value \$1,000 or over						

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : DRILLING MACHINES (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
Indexing turret head	831	11,315	1,195	12,875
Heavy duty (manufac- turing)	139	956		10,774
All other vertical (up right) drilling machines	293	5,620	566	10,203
Radial drilling machines:				18,027
Plain and universal:				
Under 13" column *	255	2,545		
13" column and over	276	5,281	329	3,506
All other vertical (up right) drilling machines (1)			351	5,257
Multiple spindle-drilling machines (cluster of spindles driven from one central power unit) :				10,656
				14,977

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

(1) Includes some machines with an average value of under \$ 1,000.

U.S. MARKET : PRODUCTION (shipments including export) : DRILLING MACHINES (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Adjustable joint, fixed center and rail mounted	264	3,354	12,705	289	5,085	17,595
Automatic drilling machines (combination, horizontal- vertical, opposed heads) *	408	13,899	34,066			
All other automatic multiple spindle drilling machines	28	1,139	40,678	431	14,443	33,510
Deep-hole drilling machines	45	1,941	43,133	30	1,304	43,466
All other drilling machines:						
Average value under \$1,000*	592	371	627			
Average value \$1,000 or over	544	11,291	20,909	1,478	13,853	9,373

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : GEAR CUTTING MACHINES						
	1964		Average Value (\$)	1965		Average Value (\$)
	Number	Value (U.S.\$'000)		Number	Value (U.S.\$'000)	
GEAR CUTTING MACHINES (ALL WITH AN AVERAGE VALUE \$ 1,000 OR OVER, TOTAL	1,372	47,113	34,339	1,576	55,696	35,340
Gear tooth finishing machines	400	10,390	25,975	497	13,659	27,482
Gear hobbors-horizon- tal and vertical	399	11,493	28,804	395	11,693	29,603
All other gear cutting machines	573	25,230	44,031	684	30,344	44,363

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : GRINDING AND POLISHING MACHINES

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
GRINDING AND POLISHING MACHINES (EXCEPT GEAR-TOOTH GRINDING, LAPPING, POLISH- ING, AND BUFFING MACHINES)						
TOTAL :	57,819	175,885	3,042	73,044	213,552	29,236
Average value under \$ 1,000	44,192	5,903	134	55,345	5,889	106
Average value \$ 1,000 or over	13,627	169,982	12,474	17,699	207,661	11,732
External Cylindrical grind- ing machines:						
Plain	375	13,237	35,299	444	15,438	34,770
Universal	279	6,152	22,050	291	6,916	23,766
Roll grinders	104	9,839	94,606	593	27,226	45,912
Centerless grinders	529	16,155	30,539			
All other	403	22,292	55,315	586	36,547	62,367
Surface grinding machines:						
Rotary table type	529	8,746	16,533	986	12,826	13,008
Reciprocating table type (including face grinders)*	4,388	20,199	4,603	5,463	25,026	4,581

U.S. MARKET : PRODUCTION (shipments including export) :
GRINDING AND POLISHING MACHINES (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
All other surface grinding machines (including planer type)	66	469	7,106	103	805	7,816
Bench, floor and snag grinders:						
Bench (all with an average value under \$ 1,000)	27,833	1,757	63	41,503	2,635	63
Floor and snag grinders:						
Average value under \$ 1,000	2,258	618	274	1,198	346	289
Average value \$ 1,000 or over	177	481	2,717	520	871	1,675
Tool and cutter grinding machines :						
Universal *	1,054	4,182	3,968	1,381	5,053	3,653
Special (broach, drilling, mills, saw, hob, and tap):						
Average value under \$ 1,000	1,802	824	457	1,755	846	482
Average value \$ 1,000 or over	714	4,809	6,735	699	5,114	7,316

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) :
GRINDING AND POLISHING MACHINES (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Polishing and buffing machines:						
Floor type:						
Average value under \$ 1,000	361	142	393	342	143	418
Average value \$ 1,000 or over	969	2,645	2,730	1,052	3,455	3,284
Speed lathes ¹	256	241	1,021			
Swing frame, sheet metal and tubing polishing *	113	858	7,210			
Abrasive belt, drum, and disc types ¹	6,914	2,338	338	8,519	8,589	1,032
All other polishing buffing machines (including bench type) : 2						
Average value under \$ 1,000	1,848	245	132			
Average value \$ 1,000 or over	505	2,699	5,344			

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) :
GRINDING AND POLISHING MACHINES (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Honing and lapping machines:						
Honing machines (except gear honing), internal 1	1,686	6,768	4,014	1,929	6,991	3,624
Flat surface lapping machines *	411	2,190	5,328	410	2,797	4,382
All other honing and lapping machines (including external and combination boring and turning honing machines and cylindrical surface lapping machines except gear lapping)	232	3,674	15,836	238	3,017	12,676
All other grinding machines, (including internal cylindrical, disc and thread grinders) :						
Average value under \$ 1,000	2,090	509	243	3,265	1,071	328

U.S. MARKET : PRODUCTION (shipments including export) :
GRINDING AND POLISHING MACHINES (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value (\$)		Average Value (\$)
Average value \$ 1,000 or over	1,937	43,816	1,967	47,838
		22,621		24,320

- * For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.
- 1 Includes some machines with an average value of under \$ 1,000.
- 2 1965 data for "all other shapers and slotters, including vertical and horizontal 16" stroke and over" are included with "all other metal-cutting machines".

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : LATHES

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>LATHES : TOTAL</u>	<u>21,320</u>	<u>198,089</u>	<u>9,291</u>	<u>24,868</u>	<u>234,841</u>	<u>9,443</u>
Average value under \$1,000	8,439	4,400	521	9,387	4,804	511
Average value \$ 1,000 or over	12,881	193,689	15,037	15,481	230,037	14,859
Bench lathes (except bench turret lathes) 1	5,632	4,980	884	5,912	5,459	923
Manufacturing and tool room lathes :						
Floor-engine-tool room (light and heavy duty):						
Up to and including 16" swing over cross slide *	6,609	32,932	4,982	8,365	39,563	4,729
17" to 23" swing	461	8,087	17,542	312	9,924	31,808
24" swing and over	84	7,706	91,738	104	8,340	80,192

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

Includes some machines with an average value of under \$ 1,000.

U.S. MARKET : PRODUCTION (shipments including export) : LATHES (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Gap lathes *						
All other manufacturing and tool room lathes, including manufacturing (multi-tool automatics) and hollow spindle oil field	157	3,601	22,936	151	3,414	22,609
Turret lathes :						
Bench and floor light duty type (with turret attachment) and saddle type *	762	9,237	12,122	1,048	16,110	15,372
Ram type	461	7,803	16,926	583	10,893	18,684
Automatic chucking lathes:						
Single spindle	1,072	43,950	40,998	1,402	58,004	41,372
Multiple spindle	370	27,402	74,059	364	25,068	68,868

U.S. MARKET : PRODUCTION (shipments including export) : LATHES (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Average Value (\$)
Automatic between center lathes :				
Single spindle }				
Multiple spindle }	232	8,304	187	39,406
Screw (bar) machines	1,482	35,728	1,509	25,902
All other lathes (including right angle carriage lathes (T-lathes) and boring and combination boring and turning lathes) *	3,998	8,539	4,931	2,555

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

1 Includes some machines with an average value of under \$ 1,000.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : MILLING MACHINES

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>MILLING MACHINES, TOTAL</u>	<u>17,153</u>	<u>125,798</u>	<u>7,334</u>	<u>20,602</u>	<u>143,952</u>	<u>6,987</u>
Bench and hand milling machines (including knee-type bench milling machines) :						
Average value under \$ 1,000	487	174	357	703	342	486
Average value \$ 1,000 or over	363	987	2,719	320	959	2,997
Knee-type milling machines (except bench type) :						
Horizontal:						
Plain	699	10,993	15,726	699	12,132	17,356
Universal	188	3,012	16,021	201	5,639	18,104
Vertical : *						
2 horsepower and under**	9,059	20,640	2,278			
Over 2 horsepower				11,398	32,372	2,840
All other knee-type milling machines	406	7,877	19,401			

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : MILLING MACHINES (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
Bed type milling machines:				
Single spindle				
Multiple spindle and special purpose machines	482	8,501		
Ram type	130	5,637	878	14,546
Profile machines and duplicators	609	21,582		16,567
Planer type milling machines	30	6,920	889	35,413
Die sinking machines	83	1,576		39,835
Thread milling machines				
Engraving machines drum type millers, cam millers, and pantograph millers *				
All other milling machines (including skin millers, and spar millers)	24,617	237,899	5,514	44,549
				8,079

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (EXCEPT THOSE DESIGNED PRIMARILY FOR HOME WORKSHOPS, LABORATORIES, GARAGES, ETC.)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (EXCEPT THOSE DESIGNED PRIMARILY FOR HOME WORKSHOPS, LABORATORIES, GARAGES, ETC.) TOTAL</u>	<u>23,227</u>	<u>181,262</u>	<u>6,422</u>	<u>30,855</u>	<u>224,717</u>	<u>7,283</u>
Average value under \$ 1,000	18,604	6,473	348	20,053	7,643	381
Average value \$ 1,000 or over	9,623	174,789	18,164	10,802	217,074	20,096
Broaching machines:						
Hydraulic:						
Horizontal	62	4,375	70,565	62	6,925	111,694
Vertical and rotary	112	4,435	39,598	99	3,806	38,444
Mechanical (horizontal, vertical, and continuous chain type)	49	3,657	74,633	68	5,575	81,985
All other broaching machines						

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : ALL OTHER METAL CUTTING TYPE
MACHINE TOOLS (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Shapers (except gear shapers) and slotters:						
Horizontal (plain and universal) :						
Under 16" stroke ¹	318	403	1,267	268	378	1,410
16" stroke and over	118	1,294	10,966	(2)	(2)	(2)
Sawing and cut-off machines:						
Power hack saws:						
Average value under \$ 1,000	2,244	345	154	2,779	455	164
Average value \$ 1,000 or more	522	1,703	3,262	528	1,902	3,602
Circular cut-off saws:	117	545	4,658	579	1,022	1,765
Abrasive cut-off saws:						
Average value under \$ 1,000	1,159	518	447	1,068	556	521
Average value \$ 1,000 or more	659	2,272	3,448	626	2,080	3,323

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : ALL OTHER METAL CUTTING TYPE
MACHINE TOOLS (continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Band saw cut-off saws*	1,844	8,375	4,542			
All other sawing and cut-off machines:						
Average value under \$ 1,000*	6,020	2,906	483	7,646	3,833	501
Average value \$ 1,000 or over	336	6,576	19,571	2,604	15,780	6,060
Tapping machines:						
Vertical *	162	404	2,494	219	617	2,817
Nut, coupling and shell	108	924	8,556			
All other tapping machines (including horizontal and radial arm) 1	56	942	16,821	117	1,104	6,237
Contour saw and filling machines ¹ (including band type) :						
Average value under \$ 1,000	4,247	929	219			
Average value \$ 1,000 or over	2,942	8,907	3,028	5,909	10,454	1,769

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : ALL OTHER METAL CUTTING TYPE
MACHINE TOOLS (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value(\$)		Average Value(\$)
Threading machines (except thread millers and thread grinders) :				
Pipe and nipple	64	2,355	70	2,007
Bolt				28,671
All other thread- ing machines ¹	4,603	2,980	5,206	3,396
		647		652
Planers (including double housing, die block and open side)	29	1,837	162	2,801
Centering machines		63,345		17,290
Key seating machines	123	1,024		
Rifling machines	-	-	-	-
Pointing, chamfering, facing, shaving, proov- ing, counter sinking, burring, forming, and drilling machines (ex- cluding gear-tooth machines) ¹	277	1,640	265	1,675
		5,921		6,321

U.S. MARKET : PRODUCTION (shipments including export) : ALL OTHER METAL CUTTING TYPE
MACHINE TOOLS (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Average Value (\$)
Transfer machines containing multiple stations for boring, broaching, drilling, grind- ing, turning, milling, tap- ping, reaming, counter bor- ing, measuring, etc. (inclu- ding way, rotary index, cen- ter column, trunnion, plain, or pallet transfer types)	584	95,481	648	132,632
				204,756
Electrical discharge erosion machines (except electrical, assisted grinding and honing machines)	990	10,183	1,872	27,669
				14,780
All other metal cutting machines	482	16,252		

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

- 1 Includes some machines with an average value of under \$ 1,000.
- (2) 1965 data for "all other shapers and slotters, including vertical horizontal 16" stroke and over" are included with "all other metal-cutting machines".

U.S. MARKET : PRODUCTION (shipments including export) : METAL FORMING TYPE

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>METAL FORMING TYPE, TOTAL</u>	<u>58,426</u>	<u>331,609</u>	<u>5,727</u>	<u>66,324</u>	<u>409,862</u>	<u>6,180</u>
Average value under \$ 1,000	36,120	10,356	287	40,979	12,899	315
Average value \$ 1,000 or over	22,306	324,253	14,537	25,345	396,963	15,662
Punching, shearing, bending, and forming machines, total -	21,663	75,939	3,505	23,735	93,517	3,923

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : PUNCHING AND SHEARING MACHINES

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>PUNCHING AND SHEARING MACHINES, TOTAL</u>	5,731	33,241	5,797	6,286	43,887	6,982
Average value under \$ 1,000	2,798	802	287	3,142	858	273
Average value \$ 1,000 or over	2,936	32,439	11,049	3,144	43,029	13,686
Manually operated:						
Average value under \$ 1,000	2,680	754	281	3,258	1,100	338
Average value \$ 1,000 or over	295	436	1,478			
Power:						
Punches (includes combination punching and shearing machines) 1	883	7,334	8,306	931	11,638	12,501
Plate shearing machines (squaring, slitting, etc.) *	1,389	15,496	11,156	1,582	21,977	13,892

U.S. MARKET : PRODUCTION (shipments including export) (continued)

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
Bar and angle shearing machines	49	596	40	507
Rotary shearing machines*	133	4,317	121	4,885
Other punching and shearing machines:				
Average value under \$ 1,000 *	113	48	145	57
Average value \$ 1,000 or over	137	4,260	209	3,723
				17,613

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

1 Includes some machines with an average value of under \$ 1,000.

U.S. MARKET : PRODUCTION (shipments including export) : BENDING AND FORMING MACHINES

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value(\$)		Average Value(\$)
<u>BENDING AND FORMING</u>				
<u>MACHINES, TOTAL</u>				
Average value under \$ 1,000	15,922	42,693	17,499	49,430
		2,631		2,825
Average value \$ 1,000 or over	12,278	5,676	13,525	6,477
		462		479
	3,651	37,023	3,974	42,953
		10,141		10,809
Power:				
bending rolls, sheet and plate*	616	7,968	692	7,791
		12,335		11,259
Bending rolls, angles, bars, and shapes	175	2,038	248	3,187
		11,616		12,850
Bending brakes and folders*	1,928	17,658	2,026	20,417
		9,159		10,078
Rotary bending and forming machines *	121	440	146	561
		3,636		3,842
Rotary head and ram bending machines (pipe, bar, etc.)*	245	2,543	302	3,430
		10,379		11,358

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) :
BENDING AND FORMING MACHINES (cont'd)

	1964		1965	
	Number	Value (U.S.\$'000)	Value (U.S.\$'000)	Average Value(\$)
Other bending and forming machine (power)*	367	5,103		13,659
Other bending and forming machines (including power and manual) :				
Average value under \$ 1,000*	12,278	5,675	14,041	997
Average value \$ 1,000 or over	199	1,273		6,397

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

U.S. MARKET : PRODUCTION (shipments including export) : PRESSES, INCLUDING FORGING

	1964		1965	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)

Average Value (\$)

PRESSES, INCLUDING FORGING,
TOTAL

Average value under \$1,000	28,350	169,511	5,979	33,492	209,196	6,246
Average value \$1,000 or over	19,865	3,345	168	23,100	5,224	226
	8,485	166,166	19,583	10,332	203,972	19,628

Mechanical:

Open inclinable gap type:

9 tons and under:

Average value under \$1,000	2,527	664	263	2,884	622	216
Average value \$1,000 or over	69	236	3,420	162	1,134	7,000
10 to 50 tons*	1,952	6,590	3,376	2,483	8,945	3,602
51 tons and over	1,381	14,340	10,584	1,721	18,796	10,922

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export):
PRESSES, INCLUDING FORGING (cont'd)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Vertical straight sided and arch frame, excluding knuckle joint (including cam and crank) :						
Single action:						
Single point:						
200 tons and under	65	1,558	23,969	84	2,182	25,976
201 tons to 300	45	1,839	40,866	16	607	37,937
301 tons and over	48	9,440	196,666	55	7,160	130,181
Two point:						
300 tons and under	327	11,181	34,192	399	12,785	32,042
301 tons and over	204	22,817	111,848	224	29,342	130,991
Four point:						
300 tons and under	6	381	63,500			
301 tons and over	191	26,486	138,670	205	34,110	166,390

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export)
PRESSES, INCLUDING FORGING (cont'd)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Double and triple action (including toggle):						
Single point	9	488	10,653	77	19,902	258,467
Two and four point	55	14,317	260,305			
Automatic high speed presses, strip or coil fed:						
50 tons and under*	245	5,262	21,478	271	4,969	18,355
51 tons and over						
Transfer feed presses(ex- cluding automated lines of standard equipment)	225	7,455	33,133	317	11,349	35,801
Knuckle joint	8	423	52,875	19	725	38,157
Horizontal				45	1,034	22,980
Gap and horn type*	391	7,349	18,795	479	10,271	21,412
Bulldozers				43	1,694	39,395

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export)
PRESSES, INCLUDING FORGING (cont'd)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
All other mechanical presses (including end wheel type):						
Average value under \$ 1,000*	4,888	1,411	289	5,831	2,160	370
Average value \$ 1,000 or over	188	7,631	40,590	196	9,039	46,117
Hydraulic and pneumatic presses (metalworking only) :						
Vertical single section :						
Housing or straight column type:						
500 tons and under*	395	3,034	7,681)			
501 tons and over	11	1,464	133,090)	327	5,733	17,532
Open rod type*	280	3,008	10,743	392	3,286	8,383
Gap or C-frame:						
50 tons and under*	1,673	5,277	2,556	1,991	5,486	2,755
51 tons and over	-	766	17,022	2	1,733	83,839

U.S. MARKET : PRODUCTION (shipments including export)
PRESSES, INCLUDING FORGING (cont'd)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Horizontal (except extru- sion) type:						
500 tons and under*	23	427	18,565)			
501 tons and over			)	110	715	6,500
Extrusion presses	35	7,392	211,200)			
Stretch wrap forming	-	-	-	30	6,371	212,367
All other hydraulic presses:						
Average value under \$1,000* 1,429		642	449	1,053	467	443
Average value \$ 1,000 or over	527	5,193	9,853	546	6,502	11,908
Manual presses (arbor, straightening, forcing, and assembling) ¹	11,108	2,440	220	13,440	2,074	154

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

1 Includes some machines with an average value of under \$ 1,000

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : OTHER METAL FORMING MACHINE TOOLS

	1964		Average Value(\$)	1965		
	Number	Value (U.S.\$'000)		Number	Value (U.S.\$'000)	Average Value(\$)
<u>OTHER METAL FORMING MACHINE TOOLS, TOTAL</u>						
Forging machines (except presses) total	<u>6,369</u>	<u>65,463</u>	<u>10,278</u>	<u>6,889</u>	<u>73,314</u>	<u>11,513</u>
Hammers	<u>670</u>	<u>23,085</u>	<u>34,098</u>	<u>809</u>	<u>32,756</u>	<u>40,490</u>
Headers and upsetters and forging rolls	53	1,108	20,905)			
Other forging machinery, including swaging machines 1	318	14,555	45,770)	809	32,756	40,489
	299	7,422	14,113)			
Riveting machines (except hand held portable type)+	3,010	5,719	1,900	3,044	6,110	2,007
Metal container making machines :*						
Can	467	9,639	20,640)			
Other metal container making machines (inclu- ding barrel and drum)	279	2,767	9,918)	1,192	28,035	23,519
Die casting machines	261	14,379	55,091)			

U.S. MARKET : PRODUCTION (shipments including export) : OTHER METAL FORMING MACHINE TOOLS
(continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Thread rolling machinery	252	3,070	1,218	365	4,940	13,534
Spinning lathes (flow)						
turn, hydrosprin and)						
spin forge)1	1,333	1,803	1,353	1,371	1,461	1,065
Marking machines, knur-)						
ling machines, etc #)						
Metal deposit forming machines (electro forming), high energy rate metal forming machines (electro hydraulic discharge), and mechanical-pneumatic or hydraulic forming machines (piston and ram operated)	97	5,001	51,556	108	5,662	52,426
Other metalworking machinery, except machine tools, total :	2,043	23,696	11,598	2,158	28,035	12,991

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : OTHER METAL FORMING MACHINE TOOLS
(continued)

	1964			1965		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Machines for weaving and other wire fabricating (barbed wire, poultry netting, woven wire, fence machines, etc.)	1,476	13,080	88,617	1,345	12,878	95,747
Wire drawing machines and draw benches	567	10,616	18,723	813	15,157	18,643

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

+ Includes "Ram type" milling machines.

1 Includes some machines with an average value of under \$ 1,000

PART II

U.S. MARKET : PRODUCTION (shipments including export) : METALWORKING MACHINE TOOLS

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
METALWORKING MACHINERY,						
TOTAL	321,705	1,712,849	5,324	311,407	1,868,218	5,999
Average value under \$ 1,000	209,051	54,198	259	193,821	48,378	250
Average value \$ 1,000 or over	112,654	1,658,651	14,723	117,690	1,719,840	14,613
METAL-CUTTING TYPE,						
TOTAL	242,693	1,231,907	5,075	236,102	1,372,038	5,811
Average value under \$ 1,000	162,025	37,753	233	150,153	36,759	245
Average value \$ 1,000 or over	80,673	1,194,149	1,480	85,929	1,335,339	27,178

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : BORING MACHINES

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
BORING MACHINES, TOTAL	1,934	110,885	5,734	1,813	117,837	64,996
Horizontal boring, drilling & milling machines:						
Table type	223	25,040	112,287			
Floor type (including rail mounted)						
Rotary table type and all other				484	66,361	137,109
Vertical boring and turning mills (including vertical turret lathes)	237	35,621	150,299			
Precision boring machines:						
Horizontal:						
Bridge type						
Way type						
All other precision boring machines (including vertical type)	537	22,243	41,421	498	23,046	46,277
Jig boring machines	598	26,679	44,613	593	26,642	44,927
All other boring machines	339	1,302	3,840	238	1,788	7,513

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : DRILLING MACHINES

	1966		1967	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value(\$)		Average Value(\$)
<u>DRILLING MACHINES, TOTAL</u>	<u>44,453</u>	<u>105,872</u>	<u>48,797</u>	<u>122,820</u>
Average value under \$ 1,000	37,485	8,453	40,938	9,065
Average value \$ 1,000 or over	6,968	97,414	7,809	113,755
Sensitive drilling machines:				
Bench type:				
Average value under \$ 1,000	1,701	537	1,643	579
Average value \$ 1,000 or over	111	326	141	343
Floor and pedestal type:				
Average value under \$ 1,000	16,875	8,210	1,397	6,080
Average value \$ 1,000 or over				
				2,433
				4,552

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : DRILLING MACHINES (cont'd)

	1966		1967	
	Number	Value (U.S.\$'000)	Number	Average Value (\$)
Vertical (upright) drilling machines:				
Plain-upright:				
Average value under \$ 1,000	19,883	14,739	674	9,463
Average value \$1,000 or over		741		14,040
Indexing turret head Heavy duty (manufa- cturing)	2,346	33,895	2,239	25,256
All other vertical (upright) drilling machines		14,443		11,280
Radial drilling machines:				
Plain and universal:				
Under 13" column*	362	3,944	331	3,773
13" column and over		10,895		11,393
All other vertical (upright) drilling machines(1)	399	6,396	398	5,688
		16,030		14,291

* For selected products, machines with an average value of under \$1,000 have been included with a miscellaneous product within the same product class.

(1) Includes some machines with an average value of under \$1,000.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : DRILLING MACHINES (cont'd)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Multiple spindle- drilling machines (cluster of spindles driven from one central power unit):						
Adjustable joint, fixed center and rail mounted	330	5,077	13,018	405	7,671	18,941
Automatic drilling machines (combination, horizontal-vertical, opposed heads)*	685	14,490	21,153	860	20,459	23,790
All other automatic multiple-spindle drilling machines	49	1,903	38,857	64	2,706	42,231
Deep-hole drilling machines						
All other drilling machines:	1,652	16,355	9,900	40,176	27,429	6,327
Average value under \$ 1,000*						
Average value \$1,000 or over						

* For selected products, machines with an average value of under \$1,000 have been included with a miscellaneous product within the same product class.

U.S. MARKET : PRODUCTION (shipments including export) : GEAR CUTTING MACHINES

	1966			1967		
	Number	Value (U.S. \$ '000)	Average Value(\$)	Number	Value (U.S. \$ '000)	Average Value(\$)
GEAR CUTTING MACHINES (ALL WITH AN AVERAGE VALUE \$ 1,000 OR OVER), TOTAL	<u>1,591</u>	<u>59,045</u>	<u>37,112</u>	<u>1,556</u>	<u>63,851</u>	<u>41,035</u>
Gear tooth finishing machines	470	14,473	30,794	520	16,255	31,260
Gear hobbors-horizontal and vertical	420	11,191	26,645	368	11,336	30,804
All other gear cutting machine	701	33,381	47,619	668	36,260	54,281

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : GRINDING AND POLISHING MACHINES

	1966		1967			
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
GRINDING AND POLISHING MACHINES (EXCEPT GEAR- TOOTH GRINDING, LAPPING, POLISHING, AND BUFFING MACHINES) TOTAL :	98,037	235,905	24,063	91,356	247,720	27,116
Average value under \$ 1,000	77,167	8,271	107	69,344	8,974	129
Average value \$ 1,000 or over	20,870	227,634	10,907	22,012	240,334	10,918
External Cylindrical grinding machines:						
Plain	561	16,932	30,182	570	19,569	34,331
Universal	764	12,403	16,234	795	13,979	17,583
Roll grinders						
Centerless grinders	675	29,013	42,982	636	27,993	44,014
All other	475	29,339	61,763	362	24,511	67,710
surface grinding machines:						
Rotary table type	772	14,760	19,119	729	16,805	23,052
Reciprocating table type (including face grinders)*	7,182	30,873	4,293	8,277	33,798	4,687

* For selected products, machines with an average value of under \$1,000 have been included with a miscellaneous product within the same product class.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : GRINDING AND POLISHING MACHINES
(cont'd)

	1966		1967	
	Number	Value (U.S. \$'000)	Number	Average Value (\$'000)
All other surface grinding machines (including planer type)	127	1,216	101	7,842
Bench, floor and snag grinders:				
Bench (all with an average value under \$ 1,000)	57,707	3,268	51,099	81
Floor and snag grinders:				
Average value under \$ 1,000	2,732	2,796	732	2,683
Average value \$ 1,000 or over				
Tool and cutter grinding machines:				
Universal*	1,732	6,985	1,859	4,230

* For selected products, machines with an average value of under \$1,000 have been included with a miscellaneous product within the same product class.

U.S. MARKET : PRODUCTION (shipments including export) : GRINDING AND POLISHING MACHINES
(cont'd)

	1966		1967	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value(\$)		Average Value(\$)
Special (broach, drill- ing, mills, saw, hob and tap):				
Average value under \$ 1,000	3,348	1,371	5,058	1,529
Average value \$ 1,000 or over	769	5,906	934	7,654
		7,680		8,195
Polishing and buffing machines:				
Floor Type:				
Average value under \$ 1,000	355	145	237	94
Average value \$ 1,000 or over	872	3,525	716	3,022
		4,542		422
All other polishing buffing machines (including bench type speed lathes, swing frame, sheet metal and tubing, polishing, abrasive belt, drum and disc types)2:				
Average value under \$1,000	9,582	1,352	7,222	1,199
Average value \$ 1,000 or over	1,285	9,613	1,583	8,869
		7,480		5,585

Appendix 9 (cont'd)

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : GRINDING AND POLISHING MACHINES
(cont'd)

	1966		1967	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
Honing and lapping machines:				
Honing machines (except gear honing), internal(4)	2,329	9,261	1,700	7,557
Flat surface lapping machines*		3,976		4,415
All other honing and lapping machines (including external and combination boring and turning honing machines and cylindrical surface lapping machines except gear lapping)	1,139	5,732	744	6,054
				8,137
All other grinding machines (including internal cylindrical, disc and thread grinders):				
Average value under \$1,000*	3,266	1,138	721	270
Average value \$1,000 or over	2,374	50,277	2,424	54,905
		21,178		22,650

* For selected products, machines with an average value of under \$1,000 have been included with a miscellaneous product within the same product class.
(1) Includes some machines with an average value of under \$1,000.
(2) 1965 data for "all other shapers and slotters, including vertical and horizontal 16" stroke and over" are included with "all other metal-cutting machines".

U.S. MARKET : PRODUCTION (shipments including export) : LATHES

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
<u>LATHES : TOTAL</u>						
Average value under \$ 1,000	26,953	286,453	10,628	27,596	334,012	12,107
Average value \$ 1,000 or over	7,945	4,935	621	6,662	4,034	605
	19,008	281,518	14,815	20,934	329,978	15,762
Bench lathes (except bench turret lathes)(1)	5,316	6,153	974	5,189	2,647	510
Manufacturing and tool room lathes:						
Floor-engine-tool room (light and heavy duty):	10,812	50,454	4,667	13,049	58,424	4,477
Upto and including 16" swing over cross slide*						
17" to 23" swing	349	12,144	34,796	387	16,340	42,222
24" swing and over	114	9,503	83,359	126	15,393	122,166
Gap lathes*						
All other manufactur-						
ing and tool room	172	4,394	25,546	(D)	(D)	(D)
lathes, including						
manufacturing (multi-						
tool automatics) and						
hollow spindle oil						
field)						

U.S. MARKET : PRODUCTION (shipments including export) : LATHES (cont'd)

	1966		1967	
	Number	Value (U.S.\$ '000)	Number	Average Value (\$)
Turret lathes:				
Bench and floor light duty type (with turret attachment) and saddle type*	1,364	19,544	1,430	23,157
Ram type	652	12,260	698	14,125
Automatic chucking lathes:				
Single spindle	1,596	65,347	1,824	77,205
Multiple spindle	351	24,607	340	26,449
Automatic between centre lathes:				
Single spindle)				
Multiple spindle)	206	9,147	224	8,328
Screw (bar) machines	2,218	60,641	2,611	70,053
All other lathes (including right angle carriage lathes (T-lathes) and boring and combination boring and turning lathes)*	2,803	12,259	753	12,484
				1,658

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

(1) Includes some machines with an average value of under \$ 1,000.

(D) Withheld to avoid disclosing of figures for individual companies.

U.S. MARKET : PRODUCTION (shipments including export) : MILLING MACHINES

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
<u>MILLING MACHINES, TOTAL</u>	25,549	201,747	7,896	24,005	234,227	9,757
Bench and hand milling machines (including knee- type bench milling machines):						
Average value under \$ 1,000	1,131	559	494	962	493	512
Average value \$ 1,000 or over	351	1,045	2,978	335	1,088	3,248
Knee-type milling machines (except bench type):						
Horizontal:						
Plain	1,200	13,556	11,296	1,200	19,489	16,241
Universal	218	3,841	17,619	199	4,058	20,392
Vertical:*						
2 horsepower and under*)						
Over 2 horsepower	13,659	37,787	2,766	13,640	42,645	3,126
All other knee-type milling machines	)	)	)	)	)	)

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) (cont'd)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Bed type milling machines:						
Single spindle)						
Multiple spindle and)						
special purpose machines)	1,059	24,383	23,025	624	16,124	25,840
Ram type)				**	**	
Profile machines and duplicators	1,141	48,118	42,172	1,563	81,008	51,829
Planer type milling machines)						
Die sinking machines)						
Thread milling machines)				728	7,043	9,674
Engraving machines drum type millers, cam millers, and pantograph millers*)	6,790	72,458	10,671	5,416	68,489	12,646
All other milling machines (including skin millers, and spar millers))						

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

** Included above with "all other knee-type milling machines."

U.S. MARKET : PRODUCTION (shipments including export) : ALL OTHER METAL CUTTING
TYPE MACHINE TOOLS (EXCEPT THOSE DESIGNED PRIMARILY FOR HOME WORKSHOPS,
LABORATORIES, GARAGES, ETC.)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (EXCEPT THOSE DESIGNED PRIMARILY FOR HOME WORKSHOPS, LABORATORIES, GARAGES, ETC.). TOTAL	44,181	232,000	5,251	41,033	252,631	6,157
Average value under \$ 1,000	31,046	11,871	382	28,058	12,289	438
Average value \$ 1,000 or over	13,135	220,129	16,753	12,975	240,342	18,523
Broaching machines:						
Hydraulic:						
Horizontal	138	7,670	55,580	122	10,577	86,697
Vertical and rotary						
Mechanical (horizontal, vertical, and conti- nuous chain type)	113	6,881	60,894	9	365	40,556
All other broaching machines						

U.S. MARKET : PRODUCTION (shipments including export)
ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (cont'd)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
<u>Shapers (except gear shapers) and slotters:</u>						
Horizontal (plain and universal):						
Under 16" stroke (1)	272	294	1,081)			
16" stroke and over	174	2,267	13,029)	192	2,438	12,698
<u>Sawing and cut-off machines:</u>						
Power hack saws:						
Average value under \$ 1,000	3,080	560	182	4,001	694	173
Average value \$ 1,000 or more	510	2,041	4,002	603	2,337	3,876
Circular cut-off saws	1,103	1,690	1,532	324	1,322	4,080
<u>Abrasive cut-off saws:</u>						
Average value under \$ 1,000	1,481	604	408	1,602	675	421
Average value \$ 1,000 or over	983	3,632	3,695	774	2,904	3,752

U.S. MARKET : PRODUCTION (shipments including export)
ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (cont'd)

	1966			1967		
	Number	Value (U.S. \$ '000)	Average Value (\$)	Number	Value (U.S. \$ '000)	Average Value (\$)
All other sawing and cut- off machines (including band saw cut-off saws):						
Average value under \$ 1,000*	11,407	5,634	494	11,456	6,159	538
Average value \$ 1,000 or over	3,716	22,756	6,124	3,391	21,928	6,467
Tapping machines:						
Vertical*	225	724	3,218	(D)	(D)	(D)
Nut, coupling and shell)						
All other tapping	180	1,817	10,094	110	1,748	15,891
machines (including						
horizontal and radial						
arm)(1)						
Contour saw and filling machines (1) (including band type):						
Average value under \$ 1,000	7,174	12,513	1,744	2,443	883	361
Average value 1,000 or over						

U.S. MARKET : PRODUCTION (shipments including export)
ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (cont'd)

	1966		1967	
	Number	Value (U.S. '000)	Number	Value (U.S. '000)
		Average Value(\$)		Average Value(\$)
Threading machines(except thread millers and thread grinders):				
Pipe and nipple				
Bolt	9,288	5,926		
All other threading machines(1)		638		
Planners (including double housing, die block and open side)	3,243(2)	34,246(2)	432	3,784
Centering machines		10,560		8,759
Rifling machines				
Pointing, chamfering, facing, shaving, prooving, counter sinking, burring, forming, and drilling machines (excluding gear- tooth machines)(1)				
and key seating machines	483	2,607	269	2,075
		5,398		7,714

U.S. MARKET : PRODUCTION (shipments including export)
ALL OTHER METAL CUTTING TYPE MACHINE TOOLS (cont'd)

	1966		1967			
	<u>Number</u>	<u>Value</u> <u>(U.S.\$'000)</u>	<u>Average</u> <u>Value (\$)</u>	<u>Number</u>	<u>Value</u> <u>(U.S.\$'000)</u>	<u>Average</u> <u>Value (\$)</u>
Transfer machines containing multiple stations for boring, broaching, drilling, grinding, turning, milling, tapping, reaming, counter boring, measuring, etc. (including way, rotary index, center column, trunnion, plain or pallet transfer types)	611	120,138	196,625	637	131,708	206,763
Electrical discharge erosion machines (except electrical, assisted grinding and honing machines)	-	-	-	-	-	-
All other metal cutting machines	(2)	(2)	(2)	11,183	41,685	3,727

(1) Includes some machines with an average value of under \$ 1,000.

(2) Planers and all other metal cutting machines merged together.

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

(D) Withheld to avoid disclosing of figures for individual companies.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : METAL FORMING TYPE

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
METAL FORMING TYPE, TOTAL	79,007	480,342	6,087	75,573	496,382	6,568
Average value under \$ 1,000	47,026	16,440	350	43,734	12,492	286
Average value \$ 1,000 or over	31,981	474,502	14,837	31,839	483,890	15,198
Punching, shearing, bending, and forming machines, total	27,225	100,694	3,699	27,795	86,062	3,096

U.S. MARKET : PRODUCTION (shipments including export) : PUNCHING AND SHEARING MACHINES

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
<u>PUNCHING AND SHEARING MACHINES, TOTAL</u>						
Average value under \$ 1,000	8,845	49,634	5,618	8,552	53,323	6,656
Average value \$ 1,000 or over	4,974	1,481	298	4,706	1,480	314
	3,871	48,213	12,455	3,846	55,443	14,416
Manually operated:						
Average value under \$ 1,000	2,113	1,239	586	(D)	(D)	(D)
Average value \$ 1,000 or over						
Power:						
Punches (include combination punching and shearing machines) (1)	803	13,976	17,405	313	15,971	19,524
Plate shearing machines (squaring, slitting, etc.)*	1,695	20,972	12,373	1,833	23,396	12,764
Bar and angle shearing machines	1,137	8,244	7,251	(D)	(D)	(D)
Rotary shearing machines*				460	6,704	14,574

U.S. MARKET : PRODUCTION (shipments including export) : PUNCHING AND SHEARING MACHINES
(continued)

	1966		1967			
	Number	Value (U. S. \$ '000)	Average Value (\$)	Number	Value (U. S. \$ '000)	Average Value (\$)
Other punching and shearing machines:						
Average value under \$ 1,000*	3,097	5,263	1,699	4,706	1,480	314
Average value \$ 1,000 or over				271	6,159	22,727

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

(1) Includes some machines with an average value of under \$ 1,000.

(D) Withheld to avoid disclosing of figures for individual companies.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : BENDING AND FORMING MACHINES

	1966			1967		
	Number	Value (U. S. \$'000)	Average Value (\$)	Number	Value (U. S. \$'000)	Average Value (\$)
<u>BENDING AND FORMING MACHINES,</u>						
<u>TOTAL</u>	<u>18,380</u>	<u>51,000</u>	<u>2,775</u>	<u>14,385</u>	<u>57,442</u>	<u>3,993</u>
Average value under \$ 1,000	14,098	6,486	460	9,173	3,593	392
Average value \$1,000 or over	4,282	44,514	10,396	5,212	53,849	10,332
Power:						
Bending rolls, sheet and plate*	882	9,177	10,404	764	8,537	11,174
Bending rolls, angles, bars, and shapes	)2,165	22,803	10,532	2,441	27,990	11,467
Bending brakes and folders*)						
Rotary bending and forming machines*	)554	5,287	9,543	668	3,538	5,296
Rotary head and ram bending machines (pipe, bar, etc.)*	)			346	5,043	14,575
Other bending and forming machines (including power and manual):						
Average value under \$ 1,000*	14,088	6,479	460	9,173	3,593	392
Average value \$ 1,000 or over	691	7,254	10,498	993	8,741	8,803

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

Appendix 9 (cont'd)

U.S. MARKET PRODUCTION (shipments including export) : PRESSURE WELDING EQUIPMENT

	1963			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
PRESSURE WELDING EQUIPMENT, INCLUDING TORQUES, TOTAL	40,851	253,336	6,201	42,102	240,320	57,080
Average value under \$1,000	26,572	7,960	299	28,442	6,633	233
Average value \$ 1,000 or over	24,279	245,376	17,184	13,760	233,687	16,983
Mechanical:						
Open inclinable gyp type:						
9 tons and under:						
Average value under \$ 1000	5,401	1,539	285	7,836	995	127
Average value \$ 1,000 or over						
10 to 50 tons*	3,948	13,019	3,298	4,018	13,769	3,427
51 tons and over	2,272	26,363	11,603	2,173	24,643	11,341
Vertical straight sided and arch frame, excluding knuckle joint (Including cam and crank):						
Single action:						
Single point:						
200 tons and under	139	2,475	17,806	195	3,756	19,261
201 tons to 300)	83	9,113	109,795	44	2,347	53,840
301 tons and over)				59	8,347	141,474

U.S. MARKET : PRODUCTION (shipments including export)
PRESSES INCLUDING FORGING (cont'd)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (\$)	Number	Value (U.S.\$'000)	Average Value (\$)
Two point:						
300 tons and under	316	10,918	34,550	529	21,844	41,293
301 tons and over	293	32,548	111,085	192	30,013	156,317
Four point:						
300 tons and under)	245	37,043	151,195	149	23,715	159,161
301 tons and over)						
Double and triple action (including toggle):						
Single point	107	28,587	267,168	107	19,932	186,280
Two and four point						
Automatic high speed presses, strip or coil fed:						
50 tons and under*	586	5,017	8,561	643	6,865	10,677
51 tons and over						
Transfer feed presses (ex-)	403	16,332	40,526	393	17,582	44,737
cluding automated lines of)						
standard equipment)						
Knuckle joint)						
Horizontal)						
Gap and horn type*)	637	14,481	22,733	517	17,825	34,477
Bulldozers)						

U.S. MARKET : PRODUCTION (shipments including export)
PRESSES INCLUDING FORGING (cont'd)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
All other mechanical presses (including end wheel type):						
Average value under \$ 1,000*	4,111	2,410	586	413	135	327
Average value \$ 1,000 or over	425	11,322	26,640	306	8,192	26,771
Hydraulic and pneumatic presses (metalworking only):						
Vertical single section:						
Housing or straight column type:						
500 tons and under*	271	5,043	18,608	246	5,372	21,837
501 tons and over	464	4,566	9,841	333	3,425	10,285
Open rod type*						
Gap or C-frame:						
50 tons and under*	2,382	7,353	3,087	1,970	4,915	2,495
51 tons and over						

U.S. MARKET : PRODUCTION (shipments including export)
PRESSES INCLUDING FORGING (cont'd)

	1966		1967	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value (\$)		Average Value (\$)
Horizontal (except extru- sion) type:				
500 tons and under*				
501 tons and over	178	11,082	226	6,025
Extrusion presses		62,258		26,659
Stretch wrap forming				
All other hydraulic presses:				
Average value under			5,815	3,290
\$ 1,000*				566
Average value \$ 1,000	2,293	12,133	898	12,214
or over		5,291		13,601
Manual presses (arbor, strai- ghtening, forcing, and assembling) (1)	16,297	1,992	14,057	1,985
		122		141

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

(1) Includes some machines with an average value of under \$ 1,000.

Appendix 9 (cont'd)

U.S. MARKET : PRODUCTION (shipments including export) : OTHER METAL FORMING MACHINE TOOLS

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value (¢)	Number	Value (U.S.\$'000)	Average Value (¢)
<u>OTHER METAL FORMING MACHINE TOOLS, TOTAL</u>						
Forging machines (except presses) total	<u>7,992</u>	<u>94,077</u>	<u>11,771</u>	<u>7,747</u>	<u>98,831</u>	<u>12,757</u>
Headers and upsetters and swaging machines	<u>903</u>	<u>32,729</u>	<u>36,244</u>	<u>810</u>	<u>29,644</u>	<u>36,622</u>
Other forging machinery, including hammers and forging rolls (1)	719	21,285	29,603	663	20,925	31,561
Riveting machines (except hand held portable type)+	184	11,444	62,195	148	8,720	58,919
Metal container making machines:*	3,872	8,955	2,313	3,418	11,799	3,452
Can						
Other metal container making machines (including barrel and drum)	1,341	39,002	29,084	1,078	26,233	24,335
Die casting machines				382	20,618	53,973

U.S. MARKET : PRODUCTION (shipments including export) : OTHER METAL FORMING MACHINE TOOLS
(continued)

	1966			1967		
	Number	Value (U.S.\$'000)	Average Value(\$)	Number	Value (U.S.\$'000)	Average Value(\$)
Thread rolling machines						
Spinning lathes (flow turn, hydrospin and spin forge)(1)	1,758	7,500	4,315	472	5,487	11,625
Marking machines, knurling machines etc.*						
Metal deposit forming machines (electro forming), high energy rate metal forming machines (electro hydraulic discharge), and mechanical-pneumatic or hydraulic forming machines (piston and ram operated)	118	5,831	49,415	127	4,632	36,472
Other metalworking machinery, except machine tools, total	2,939	32,835	11,172	(845**	135**	159**
				(2,967	42,866	14,447

U.S. MARKET : PRODUCTION (shipments including export) : OTHER METAL FORMING MACHINE TOOLS
(continued)

	1966		1967	
	Number	Value (U.S.\$'000)	Number	Value (U.S.\$'000)
		Average Value (\$)		Average Value (\$)
Machines for weaving and other wire fabricating (barbed wire, poultry netting, woven wire, fence machines, etc.)	1,745	15,461	1,776	18,815
Wire drawing machines and draw benches	1,194	17,374	1,191	24,051
				20,194

* For selected products, machines with an average value of under \$ 1,000 have been included with a miscellaneous product within the same product class.

(1) Includes some machines with an average value of under \$ 1,000.

+ Includes "Ram type" milling machines.

** Figures give for other metal forming machine tools all with an average value under \$ 1,000.

Maximum Size and Capacity of Machines
Generally Manufactured in USA

<u>Machine Tool</u>	<u>Maximum Size</u>	<u>HP</u>	<u>Machining accuracy</u>
Lathes	72" swing	100	$\pm 0.002"$
Drills	4"		$\pm 0.0005"$
Planers	120" x 120" x 60"	150	$\pm 0.005"/ft$
Millers	No.6, 100" table	75	
Plano millers	180" x 180" x 80"	400	
Horizontal boring, drilling and milling	Upto 14" spindles		$\pm 0.001"$
Gear cutting	160" ϕ x 36" width		
Grinding Machines			
Cylindrical	24" d x 168" cc		
Surface	36" x 240" table size 120" dia rotary table		
Press			
Production press	4000 tons		
Hydraulic press	50000 tons		
Forging Equipment			
Drop hammers	7500 lbs		
Steam hammers	50000 lbs		
Forging machine	7"		
Forging press	50000 tons		
Pinch roll	500 tons		

Special Features of U.S.-Made Machine Tools

Lathes

- i) Tracing equipment for various requirements with controls actuated by air, hydraulics, electronics, or combinations of these.
- ii) T Lathes are radically different from basic engine lathes, being set up at right angles to the axis of spindle rotation, providing great swing capacity for turning and facing large flat workpieces.
- iii) Turret lathes with near-vertical bedways to facilitate set up (Warner & Swasey).

Automatics

- i) Single and multiple-spindle automatics for bar work.
- ii) Horizontal and vertical chucking lathes - single and multi-spindle delivering one completed part each time the machine indexes.
- iii) Centre drive lathes for simultaneous turning of both ends of a part (Lodge & Shipley).
- iv) Crankshaft lathes for turning two shafts at a time and delivering 100 finished pieces per hour (R.K. LeBlond Machine Tool Company).

Drills

- i) Tape-controlled drills with precision locating table.
- ii) Deep hole drillers - horizontal type (Motch and Merryweather).

- iii) Self-contained drill units with short stroke accomplished by means of a cam or screw, hydraulics, air pressure, or electronics (Motch & Merryweather).
- iv) Turret Drills with tape-controlled feeds, speeds, indexing and table positioning.
- v) Multiple spindle drills with universal joints.

Milling Machine

- i) Fixed bed type for repetitive production operations.
- ii) Planer type represents the ultimate in metal removal capacity. The type closely resembles planers with high capacity milling heads mounted in place of tool heads (Giddings & Lewis). Each of the heads can mount up to 100 HP, and as much as 400 HP (page 91 of Habicht) may be applied in one pass of the work. Metal removal is tremendous, yet accuracy standards are equal to those of conventional planing.
- iii) The latest developments in the planer type milling machine group include the spar millers and skin millers required by the aircraft and missile industries, designed to machine precisely tapered wing spars and complex shapes required for the skin sections of high-speed aircraft and missiles. Extremely sensitive tracer control systems with 3 axis continuous path tape controls are generally incorporated (Giddings & Lewis).
- iv) Thread millers are being increasingly used for rapid production of leadscrews with high degree of accuracy.

Gear Cutting Machines

- i) Gear forming - utilising reciprocating or linear cutter motion gear shapers, planers and broaching machines.

Appendix 11 (cont'd)

- ii) Gear tooth generating machines - producing mathematically accurate tooth profiles by means of relative motion between the cutter and the gear blank. For generating tooth form, rotating worm shaped cutters (hobs), reciprocating pinion-shaped cutters, and reciprocating rack-shaped cutters are used.

After a gear has been cut from the blank, rigid dimensional or finish requirements sometimes make secondary operations necessary for which machines such as gear grinders, shavers, lappers and deburring machines are used.

Appendix 12

Number of Plants and Employment in the U.S. Machine Tool Industry, 1967

Standard Industrial Code	Industry	Total employ- ment in plants employ- ing 20 or more	Weight index in %	Total plants employ- ing 20 or more	Number of plants by employment size				Other plants making this product
					20 to 99	100 to 499	500 or more		
3541	MACHINE TOOLS, CUTTING TYPES	80,315	.8952	259	130	90	39	135	
354111	Boring & Broaching Machines	13,970	.1557	31	8	16	7	29	
354121	Drilling Machines	11,593	.1292	34	17	12	5	32	
354131	Gear Cutters & Finishing Machines	6,480	.0722	9	1	5	3	10	
354141	Grinding & Polishing Machinery Excl Gear Honing & Lapping	14,396	.1605	53	29	19	5	51	
354145	Sawing & Cutting Machines	2,900	.0323	21	14	5	2	27	
354151	Lathes	11,023	.1229	34	14	10	10	30	
354161	Milling Machines	7,943	.0885	20	10	8	2	37	
354169	Special Cutting Machine Tools	7,332	.0817	19	8	7	4	10	
354180	Other Machine Tools N.E.C. Incl. Shapers & Planers	3,675	.0410	20	12	7	1	48	
354191	Parts for Metal Cutting Machine Tools	463	.0052	6	5	1	-	19	
354194	Rebuilt Metal Cutting Type Machine Tools	540	.0060	12	12	-	-	14	
3542	MACHINE TOOLS, METAL FORMING TYPES	28,857	.3216	160	93	50	17	140	
354211	Punching & Shearing Machines	3,286	.0366	19	9	9	1	18	
354212	Bending & Forming Machines	2,793	.0311	29	17	11	1	33	
354221	Presses	15,607	.1740	60	32	17	11	67	

Appendix 12 (cont'd)

Number of Plants and Employment in the U.S. Machine Tool Industry, 1967 (continued)

Standard Industrial Code	Industry	Total employ- ment in plants employ- ing 20 or more	Weight index in %	Total plants employ- ing 20 or more	Number of plants by employment size				Other plants making this product
					20 to 99	100 to 499	500 to 999	1,000 or more	
354231	Forging & Riveting Machines	1,647	.9184	12	8	3	1		23
354232	Container Making Machinery	2,325	.0259	11	6	3	2		12
354233	Die Casting Machinery	600	.0067	9	7	2			7
354235	Thread Rolling Machinery & Spinning Lathes	1,645	.0183	5	1	3	1		9
354239	Other Metal Forming Machine Tools Incl Molding Machines	318	.0035	4	3	1			23
354241	Parts for Metal Forming Machine Tools	366	.0041	7	7				12
354247	Rebuilt Metal Forming Machine Tools	270	.0030	4	3	1			3

Plant and Employment Engaged in Production of Metal-Cutting Machine Tools
(SIC - 3541) in the U.S., By State, 1967

State	Total employment in this industry in plants employing 20 or more	Percent of Total Metal- working Employment in plant employing 20 or more	Total Plants in industry employing 20 or more	Number of Plants by Employment Size			Other Plants making this product
				20 to 99	100 to 499	500 or more	
Alabama	-	-	-	-	-	-	-
Alaska	-	-	-	-	-	-	-
Arizona	50	.0006	1	1	-	-	-
Arkansas	-	-	-	-	-	-	-
California	850	.0095	13	12	1	-	6
Colorado	-	-	-	-	-	-	-
Connecticut	7,755	.0864	19	13	2	4	9
Delaware	-	-	-	-	-	-	1
Dist. of Columbia	-	-	-	-	-	-	-
Florida	30	.0003	1	1	-	-	1
Georgia	32	.0004	1	1	-	-	1
Hawaii	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-
Illinois	7,683	.0856	29	13	12	4	14
Indiana	2,150	.0240	5	1	2	2	3
Iowa	-	-	-	-	-	-	1
Kansas	130	.0014	1	-	1	-	1
Kentucky	342	.0038	2	-	2	-	1
Louisiana	-	-	-	-	-	-	1
Maine	-	-	-	-	-	-	-
Maryland	-	-	-	-	-	-	1

Appendix 13 (Cont'd)

State	Total employment in this industry in plants employing 20 or more	Percent of Total Metal-Working Employment in plant employing 20 or more	Total Plants in industry employing 20 or more	Number of Plants by Employment Size				Other Plants making this product
				20 to 99	100 to 499	500 or more		
Massachusetts	8,707	.0970	16	7	6	3	7	
Michigan	8,631	.0962	52	25	22	5	25	
Minnesota	739	.0082	5	4	-	1	2	
Mississippi	-	-	-	-	-	-	-	
Missouri	643	.0072	4	3	1	-	-	
Montana	-	-	-	-	-	-	-	
Nebraska	-	-	-	-	-	-	-	
Nevada	-	-	-	-	-	-	-	
New Hampshire	500	.0056	1	-	-	-	-	
New Jersey	430	.0048	7	5	2	1	3	
New Mexico	-	-	-	-	-	-	-	
New York	5,047	.0563	19	12	5	-	10	
North Carolina	-	-	-	-	-	2	1	
North Dakota	-	-	-	-	-	-	-	
Ohio	18,854	.2101	43	16	18	9	26	
Oklahoma	-	-	-	-	-	-	-	
Oregon	-	-	-	-	-	-	-	
Pennsylvania	1,840	.0205	10	7	2	1	1	
Rhode Island	4,402	.0491	6	2	3	1	-	
South Carolina	-	-	-	-	-	-	-	

State	Total employment in this industry in plants employing 20 or more	Percent of Total Metal- working Employment in plant employing 20 or more	Total Plants in industry employing 20 or more	Number of Plants by Employment Size			Other Plants making this product
				20 to 99	100 to 499	500 or more	
South Dakota	125	.0014	1	-	1	-	-
Tennessee	264	.0029	2	1	1	-	1
Texas	140	.0016	1	-	1	-	1
Utah	-	-	-	-	-	-	-
Vermont	4,021	.0448	4	-	1	3	1
Virginia	-	-	-	-	-	-	-
Washington	75	.0008	1	1	-	-	-
West Virginia	-	-	-	-	-	-	-
Wisconsin	6,875	.0766	15	5	7	3	10
Wyoming	-	-	-	-	-	-	-

Source: Iron Age, Metalworking Marketing Guide, Vol. 3

Plants and Employment Engaged in Production of Metal-Forming Machine Tools
(SIC 3542) in the U.S., by State, 1967

State	Total employment in this industry in plants employing 20 or more	Percent of Total Metal- working Employment in plant employing 20 or more	Total Plants in industry employing 20 or more	Number of Plants by Employment Size			Other Plants making this product
				20 to 99	100 to 499	500 or more	
Alabama	45	.0005	1	1	-	-	-
Alaska	-	-	-	-	-	-	-
Arizona	25	.0003	1	1	-	-	-
Arkansas	-	-	-	-	-	-	-
California	1,945	.0217	13	7	5	1	11
Colorado	-	-	-	-	-	-	-
Connecticut	1,033	.0115	7	3	4	-	10
Delaware	-	-	-	-	-	-	-
Dist. of Columbia	-	-	-	-	-	-	-
Florida	-	-	-	-	-	-	-
Georgia	284	.0032	1	-	1	-	2
Hawaii	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-
Illinois	7,398	.0825	29	17	9	3	12
Indiana	549	.0061	8	6	2	-	7
Iowa	-	-	-	-	-	-	-

Appendix 14 (Cont'd)

State	Total employment in this industry in plants employing 20 or more	Percent of Total Metal- working Employment in plant employing 20 or more	Total Plants in industry employing 20 or more	Number of Plants by Employment Size			Other Plants making this product
				10 to 99	100 to 499	500 or more	
Kansas	-	-	-	-	-	-	-
Kentucky	-	-	-	-	-	-	-
Louisiana	-	-	-	-	-	-	-
Maine	600	.0067	1	-	-	1	-
Maryland	25	.0003	1	1	-	-	5
Massachusetts	237	.0026	4	3	1	-	4
Michigan	2,494	.0278	18	12	5	1	24
Minnesota	745	.0083	5	2	3	-	1
Mississippi	-	-	-	-	-	-	-
Missouri	410	.0046	4	1	3	-	2
Montana	-	-	-	-	-	-	-
Nebraska	60	.0007	1	1	-	-	-
Nevada	-	-	-	-	-	-	-
New Hampshire	55	.0006	1	1	-	-	-
New Jersey	364	.0041	7	6	1	-	7
New Mexico	-	-	-	-	-	-	-
New York	2,486	.0277	13	8	3	2	8
North Carolina	266	.0030	4	3	1	-	-
North Dakota	-	-	-	-	-	-	-
Ohio	7,031	.0784	21	8	6	7	17

Appendix 14 (Cont'd)

State	Total employment in this industry in plants employing 20 or more	Percent of Total Metal- working Employment in plant employing 20 or more	Total Plants in industry employing 20 or more	Number of Plants by Employment Size			Other Plants making this product
				10 to 99	100 to 499	500 or more	
Oklahoma	-	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-
Pennsylvania	2,220	.0247	10	6	2	2	16
Rhode Island	-	-	-	-	-	-	3
South Carolina	-	-	-	-	-	-	1
South Dakota	-	-	-	-	-	-	-
Tennessee	35	.0004	1	1	-	-	-
Texas	125	.0014	2	1	1	-	3
Utah	-	-	-	-	-	-	2
Vermont	125	.0014	2	1	1	-	-
Virginia	-	-	-	-	-	-	1
Washington	20	.0002	1	1	-	-	-
West Virginia	-	-	-	-	-	-	1
Wisconsin	282	.0031	4	2	2	-	-
Wyoming	-	-	-	-	-	-	5

U.S. Imports of Metalworking Machine Tools for Consumption by Type and Country of Origin, 1965-67

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
	Grand Total	32,270	54,796,266	1,698	61,679	117,748,460	1,909	61,245	177,780,294	2,903
7151010	Machine Tools for cutting or Hobbing Gears									
	U.K.	5	42,295	8,457	16	123,569	7,723	29	121,433	4,189
	West Germany	84	2,508,510	27,480	129	1,659,744	12,866	135	2,536,113	18,786
	Czechoslovakia	1	10,522	10,522	3	17,235	5,745	6	57,498	9,583
	Switzerland	130	844,076	6,493	96	399,660	4,163	91	802,790	8,822
	Japan	7	68,154	9,736	12	187,876	15,656	11	82,537	7,503
	Canada	-	-	-	1	3,720	3,720	1	12,879	12,879
	France	-	-	-	24	46,068	1,920	4	5,967	992
	Netherlands	-	-	-	-	-	-	2	7,583	3,791
	Total	227	3,273,347	14,420	281	2,437,872	8,676	279	5,624,850	12,993
7151020	Drilling Machines									
	U.K.	15	261,178	17,412	117	547,291	4,678	145	828,146	5,711
	West Germany	122	259,940	2,131	329	915,410	2,782	479	1,639,432	5,423
	Czechoslovakia	34	69,401	2,041	89	181,149	2,035	90	166,144	1,868
	Switzerland	29	101,304	3,493	73	170,241	2,332	74	463,935	6,297
	Japan	541	313,240	579	1,276	878,731	689	2,464	1,199,782	450
	Canada	3	16,226	5,409	30	111,741	3,725	60	184,213	2,570
	France	1	7,500	7,500	12	3,446	287	4	10,486	2,622
	Netherlands	-	-	-	19	90,739	4,776	145	828,146	5,711
	Mexico	3	25,263	8,421	1	8,305	8,305	4	1,070	268
	Argentina	1	765	765	-	-	-	-	-	-
	Sweden	787	473,084	601	1,182	607,298	514	1,182	788,217	667
	Denmark	3	14,051	7,025	2	4,370	2,185	3	11,692	3,897
	Austria	2	5,641	1,820	2	7,133	3,566	2	7,611	3,806

Appendix 15 (Cont'd)

SITC	Product Description	1965			1966			1967		
		Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
			\$	\$		\$	\$		\$	\$
7151020	<u>Drilling Machines</u>									
	Poland	8	23,721	2,965	13	39,298	3,022	25	55,662	2,226
	Spain	2	4,799	2,399	6	10,594	1,766	22	57,327	2,592
	Portugal	32	18,516	579	48	24,644	513	70	54,540	435
	Italy	235	674,192	2,873	513	1,434,282	2,796	595	2,136,568	3,601
	Australia	-	-	-	2	1,871	935	-	-	-
	Brazil	-	-	-	4	1,146	286	-	-	-
	Belgium	-	-	-	1	9,220	9,220	3	27,221	9,073
	East Germany	-	-	-	13	51,053	3,923	18	38,300	2,123
	Hungary	-	-	-	-	-	-	11	35,947	3,268
	India	-	-	-	-	-	-	4	15,982	4,733
	Total	1,864	2,266,821	1,216	3,732	5,097,957	1,366	5,304	7,586,140	1,430
7151030	<u>Milling Machines</u>									
	U.K.	168	789,055	4,697	527	2,002,120	3,799	685	4,551,620	6,645
	West Germany	307	2,143,404	6,982	415	4,679,896	11,277	534	6,243,532	11,632
	Czechoslovakia	13	67,370	5,192	48	309,177	6,441	62	579,536	6,111
	Switzerland	55	304,163	5,530	95	542,920	5,715	127	975,444	7,691
	Japan	148	825,390	5,597	642	4,083,873	6,369	1,078	7,640,561	7,088
	Canada	144	479,104	3,327	483	1,796,255	3,698	890	2,964,583	5,331
	France	14	127,491	9,107	50	233,526	4,671	102	1,001,997	9,823
	Netherlands	1	4,705	4,705	6	38,247	6,375	47	423,542	9,119
	Argentina	2	9,828	4,914	-	-	-	8	58,174	7,272
	Sweden	97	299,535	3,066	243	865,020	3,560	274	852,199	3,110
	Denmark	-	-	-	1	2,903	2,903	6	31,626	5,271
	Austria	1	361,465	361,465	2	358,159	179,079	4	14,900	3,725
	Poland	4	21,099	5,275	9	38,034	4,226	23	125,406	5,452
	Spain	15	54,269	2,285	101	192,463	1,906	273	714,145	2,615
	Italy	131	557,696	4,257	764	2,154,832	2,820	1,565	5,211,714	3,330
	Belgium	1	32,970	32,970	-	-	-	7	138,574	19,797

Appendix 15 (Cont'd)

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151030	Milling Machine									
	East Germany	-	-	-	6	105,693	17,291	2	16,651	8,325
	Norway	7	7,000	1,000	-	-	-	-	-	-
	Israel	20	1,264	63	20	1,264	63	-	-	-
	Jamaica	-	-	-	1	2,288	2,288	-	-	-
	India	-	-	-	1	3,673	3,673	-	-	-
	Hungary	-	-	-	-	-	-	3	25,059	8,353
	USSR	-	-	-	-	-	-	6	36,221	6,037
	Yugoslavia	-	-	-	-	-	-	16	20,680	1,293
	Pakistan	-	-	-	-	-	-	2	6,290	3,145
	Hong Kong	-	-	-	-	-	-	1	7,181	7,181
	Total	1,128	6,065,608	5,377	3,405	17,403,533	5,111	5,715	81,443,695	5,502
7151040	Boring Machines and Vertical Turret									
	U.S.	28	513,252	19,740	76	1,390,625	18,166	89	2,887,347	32,442
	West Germany	75	1,617,712	21,569	190	4,203,384	22,123	271	6,321,577	23,544
	Czechoslovakia	12	285,085	23,757	28	651,716	23,276	12	608,799	50,567
	Switzerland	63	1,877,780	29,608	92	2,368,731	25,747	113	2,363,138	20,913
	Japan	37	518,753	13,967	56	1,173,101	20,948	89	1,866,494	20,972
	Canada	9	115,011	12,779	34	74,798	2,199	41	110,562	2,697
	France	4	98,824	24,706	6	337,113	56,185	9	346,489	38,499
	Netherlands	-	-	-	1	15,000	15,000	2	39,244	19,622
	Argentina	-	-	-	-	-	-	-	-	-
	Sweden	1	6,321	6,321	3	5,292	1,764	-	-	-
	Denmark	32	76,330	2,385	24	95,499	3,979	11	33,221	3,020
	Austria	2	5,185	2,592	-	-	-	64	28,686	448
	Poland	-	-	-	2	80,147	40,073	13	163,633	12,567
	Spain	5	56,618	11,324	9	86,116	9,568	29	201,951	6,963

STC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151040	Boring Machines and Vertical Turret	-	-	-	-	-	-	-	-	-
	Portugal	118	750,652	6,361	142	2,013,936	14,213	164	5,423,493	33,070
	Italy	8	126,335	15,792	9	107,471	11,941	10	124,610	12,461
	Belgium	2	16,106	8,053	16	239,568	14,973	20	323,025	1,645
	East Germany	-	-	-	4	2,088	522	-	-	-
	Finland	-	-	-	-	-	-	-	-	-
Total		394	6,061,962	15,386	692	12,839,586	19,554	937	21,046,249	22,461
7151050	Lathes except vertical Turret Lathes	-	-	-	-	-	-	-	-	-
	U.K.	1,201	3,111,083	2,590	2,105	7,705,021	3,600	2,726	11,326,226	4,155
	West Germany	1,088	2,929,280	2,702	1,925	7,873,434	4,090	1,458	8,655,017	5,936
	Czechoslovakia	101	458,058	4,535	170	465,256	2,654	175	612,964	3,503
	Switzerland	488	2,029,911	4,130	915	4,549,005	4,972	779	3,964,596	5,077
	Japan	697	2,511,883	3,517	2,115	7,554,663	3,572	2,756	10,202,748	3,702
	Canada	122	39,604	325	789	442,484	561	1,163	1,083,125	934
	France	470	1,534,601	2,861	786	4,104,980	5,223	497	4,983,609	9,826
	Netherlands	7	24,760	3,537	49	173,209	3,535	34	121,623	3,577
	Argentina	9	20,053	2,228	-	-	-	4	11,061	2,765
	Sweden	59	53,744	911	36	117,498	3,264	114	183,710	1,611
	Denmark	2	13,634	6,817	5	15,982	5,327	57	1,677	29
	Austria	4,071	415,406	102	4,978	839,371	169	4,806	823,990	191
	Poland	7	30,551	4,336	29	116,197	4,007	105	272,638	2,597
	Spain	17	39,363	2,515	44	73,491	1,670	157	304,555	1,940
	Portugal	3	9,564	3,188	15	50,999	3,400	11	38,742	3,451
	Italy	311	1,220,435	3,924	712	3,117,587	4,379	982	4,377,875	4,438
	Australia	2	5,971	2,965	4	3,278	819	1	8,445	8,445

Appendix 15 (Cont'd)

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151050	<u>Lathes except vertical</u>									
	<u>Turret Lathes</u>									
	Brazil	10	25,050	2,505	51	189,843	3,722	64	177,801	2,778
	Belgium	9	64,805	7,200	74	306,781	4,146	61	457,630	7,502
	East Germany	-	-	-	2	23,724	11,862	5	64,491	12,898
	Hungary	-	-	-	-	-	-	7	26,086	3,726
	India	62	62,728	1,012	12	14,791	1,233	190	89,054	469
	Mexico	-	-	-	2	8,652	4,326	-	-	-
	Yugoslavia	-	-	-	1	892	892	-	-	-
	Rumania	-	-	-	1	14,035	14,035	1	14,035	14,035
	Norway	-	-	-	1	1,716	1,716	-	-	-
	Ireland	-	-	-	-	-	-	1	30,910	30,910
	Total	8,738	14,210,244	1,627	14,819	57,152,049	2,507	15,654	47,726,207	3,049
7151060	<u>Grinding Machines</u>									
	U.K.	347	843,122	2,430	698	1,557,668	2,232	850	2,236,056	2,651
	West Germany	1,097	2,051,735	1,870	1,886	4,453,888	2,362	1,497	4,817,592	3,218
	Czechoslovakia	24	119,632	4,985	25	190,847	7,632	31	84,731	2,733
	Switzerland	261	1,243,740	5,895	396	2,073,138	5,235	457	2,236,147	4,835
	Japan	60	192,377	3,206	352	995,579	2,828	494	2,021,784	4,083
	Canada	57	381,016	6,685	66	553,961	8,393	118	238,454	2,021
	France	527	207,227	393	384	123,594	322	174	191,219	1,099
	Netherlands	14	53,711	3,837	50	191,884	3,837	98	427,455	4,362
	Argentina	-	-	-	-	-	-	-	-	-
	Sweden	108	490,472	4,541	289	483,344	1,672	196	1,052,271	5,369
	Denmark	62	114,209	1,842	157	406,685	2,429	176	355,678	2,021
	Austria	3	3,778	1,256	13	17,871	1,375	168	11,728	70
	Poland	1	2,300	2,300	29	116,197	4,007	4	8,951	2,238
	Spain	31	42,808	1,381	85	128,820	1,404	181	303,912	1,679
	Portugal	-	-	-	15	50,999	3,400	-	-	-
	Italy	185	695,845	3,761	534	1,256,895	2,354	467	1,834,409	4,067

Appendix 15 (Cont'd)

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151070	Machine Tools, Metal- Cutting not elsewhere Specified									
	West Germany	3,279	3,872,148	1,181	17,878	6,260,089	350	4,158	9,079,005	2,184
	Austria	4	15,320	3,850	15	38,252	2,550	590	107,733	276
	N. Antil	-	-	-	1	590	590	-	-	-
	Mexico	-	-	-	-	-	-	2	10,940	5,470
	Bermuda	-	-	-	-	-	-	1	471	471
	Brazil	-	-	-	-	-	-	7	3,420	489
	Argentina	-	-	-	-	-	-	1	906	906
	East Germany	-	-	-	-	-	-	4	2,410	603
	Czechoslovakia	1	2,221	2,221	-	-	-	1	51,226	51,226
	Switzerland	344	2,008,912	5,834	1,043	3,543,618	3,398	724	3,715,279	5,132
	Poland	-	-	-	38	563	15	-	-	nil
	Spain	16	67,969	4,248	49	103,951	2,121	73	178,235	2,442
	Italy	202	885,264	4,382	496	1,189,200	2,397	429	1,883,905	4,391
	USSR	-	-	-	-	-	-	1	4,546	4,546
	Hong Kong	7	943	135	12	11,244	937	3	5,004	1,668
	Israel	-	-	-	270	690,488	-	777	754,888	972
	Japan	4,648	376,847	81	586	1,059,592	1,808	5,487	1,396,176	254
	India	-	-	-	-	-	-	1	1,260	1,260
	Australia	2	14,671	7,335	-	-	-	3	3,073	1,024
	Total	8,552	8,204,308	959	26,340	17,096,328	649	17,076	26,094,781	1,528
7151090	Machine Tools, Metal- Working not elsewhere Specified									
	Canada	312	796,983	2,554	279	1,138,670	4,081	724	1,671,756	2,309
	Mexico	1	288	288	5	23,601	4,720	27	61,936	2,294
	Venezuela	1	2,000	2,000	-	-	-	3	3,534	1,111
	Sweden	228	157,625	604	639	241,306	378	497	734,642	1,478
	Brazil	-	-	-	-	-	-	1	7,404	7,404

Appendix 15 (Cont'd)

SITC	Product Description	1965			1966			1967		
		Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
			\$	\$		\$	\$		\$	\$
7151080	Machine Tools, Metal-									
	Working not elsewhere									
	Specified									
	Norway	39	191,277	4,905	18	215,784	13,487	10	168,260	16,826
	Denmark	39	47,911	1,228	92	19,678	214	77	61,943	804
	U.K.	412	1,016,619	2,468	642	1,728,803	2,683	793	4,137,730	5,218
	Netherlands	2	20,055	10,027	4	23,323	5,831	16	61,532	3,846
	Ireland	-	-	-	1	4,236	4,236	-	-	-
	Belgium	6	123,480	20,580	3	39,492	13,164	16	268,457	16,779
	France	423	210,017	496	309	189,180	612	106	789,566	7,448
	West Germany	1,444	4,231,611	2,930	1,534	5,248,324	3,421	1,742	11,034,097	6,334
	East Germany	-	-	-	1	6,070	6,070	-	-	-
	Austria	1	1,929	1,929	25	776,700	31,068	16	955,216	59,701
	Czechoslovakia	2	6,373	3,186	1	6,876	6,876	-	-	-
	Hungary	-	-	-	-	-	-	1	3,782	3,782
	Switzerland	213	522,897	2,455	234	1,350,080	5,770	263	647,498	2,462
	Spain	11	45,764	4,160	7	27,310	3,901	34	39,241	1,154
	USSR	-	-	-	-	-	-	1	1,478	1,478
	Italy	761	457,013	601	937	649,075	693	597	1,428,221	2,382
	Hong Kong	7	946	135	-	-	-	3	5,004	1,668
	Israel	-	-	-	298	15,310	51	-	-	-
	Japan	4,648	376,847	81	2,369	1,343,047	57	6,410	2,165,514	338
	Australia	2	14,671	7,335	48	13,367	278	7	11,468	1,632
	Rep. South Africa	-	-	-	-	-	-	2	1,840	920
	Total	8,552	8,204,306	959	7,444	13,060,237	1,754	11,346	24,259,913	2,138
	GRAND TOTAL:	32,270	54,796,266	1,698	61,679	117,748,460	1,909	61,245	177,780,294	2,903

Source: U.S. Bureau of the Census, U.S. Imports of Merchandise for Consumption, Report FT-125, Washington, DC.

U.S. Imports of Metalworking Machine Tools for Consumption by Country and Type, 1965-67

FROM ITALY

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151010	Machine Tools for cutting or hobbing Gears	-	-	-	-	-	-	-	-	-
7151020	Drilling Machines	265	674,192	2,873	513	1,454,282	2,793	593	2,135,568	3,601
7151030	Milling Machines	131	557,696	4,257	764	2,154,832	2,820	1,505	5,211,714	3,330
7151040	Boring Machines and Vertical Turret	118	750,652	6,361	142	2,019,936	14,218	164	5,423,493	33,070
7151050	Lathes except vertical Turret Lathes	311	1,220,435	3,924	712	3,117,587	4,379	982	4,377,675	4,458
7151060	Grinding Machine	185	695,845	3,761	534	1,256,895	2,354	467	1,694,409	4,057
7151070	Machine Tools, Metal-Cutting not elsewhere Specified	202	865,264	4,322	496	1,189,200	4,397	429	1,883,906	4,391
7151080	Machine Tools, Metal-Working not elsewhere Specified	761	457,013	601	937	649,075	693	597	1,428,221	2,392
	Total:	1,948	5,241,097	2,691	4,038	11,820,807	2,885	4,797	22,355,196	4,660

Appendix 18 (Cont'd)

U.S. Imports of Metalworking Machine Tools for Consumption by Country and Type, 1965-67

FROM JAPAN

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151010	Machine Tools for cutting or Hobbing Gears	7	68,154	9,736	12	187,876	15,656	11	62,587	7,503
7151020	Drilling Machines	541	513,240	579	1,276	878,731	689	2,464	1,108,782	450
7151030	Milling Machines	148	825,390	5,577	642	4,088,873	6,369	1,078	7,640,561	7,088
7151040	Boring Machines and Vertical Turret	37	516,753	13,967	56	1,173,101	20,948	89	1,866,494	20,972
7151050	Lathes except vertical Turret Lathes	697	2,311,883	3,317	2,115	7,554,663	3,572	2,756	10,202,748	3,702
7151060	Grinding Machine	60	192,377	3,206	352	995,579	2,828	494	2,021,784	4,093
7151070	Machine Tools, Metal- Cutting not elsewhere Specified	4,648	576,847	81	586	1,059,592	1,808	5,487	1,396,176	254
7151080	Machine Tools, Metal- Working not elsewhere Specified	4,648	376,847	81	2,369	1,343,047	57	6,410	2,105,514	338
	Total:	10,786	4,981,491	462	7,408	17,281,462	2,353	18,789	26,485,596	1,410

Appendix 16 (Cont'd)

U.S. Imports of Metalworking Machine Tools for Consumption by Country and Type, 1965-67

FROM SWITZERLAND

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151010	Machine Tools for cutting or Hacking Gears	130	844,076	6,493	96	399,060	4,163	91	802,790	8,822
7151020	Drilling Machines	29	101,304	3,493	73	170,241	2,332	74	465,955	6,297
7151030	Milling Machines	55	304,105	5,530	95	542,920	5,715	127	975,444	7,681
7151040	Boring Machines and Vertical Turret	63	1,877,760	29,806	92	2,368,731	25,747	113	2,363,158	20,913
7151050	Lathes except Vertical Turret Lathes	488	2,029,811	4,160	915	4,549,005	4,972	779	3,954,596	5,077
7151060	Grinding Machines	261	1,243,740	5,835	399	2,073,139	5,235	457	2,256,147	4,893
7151070	Machine Tools, Metal-Cutting not elsewhere Specified	344	2,006,912	5,834	1,043	3,543,618	3,398	724	3,715,279	5,152
7151080	Machine Tools, Metal-Working not elsewhere Specified	213	522,897	2,455	234	1,350,080	5,770	285	647,486	2,400
	Total:	1,583	8,950,783	5,642	2,944	14,997,396	5,084	2,648	15,180,847	5,725

U.S. Imports of Metalworking Machine Tools For Consumption by Country and Type, 1965-67

FROM U.K.

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151010	Machine Tools for cutting or Hobbing Gears	5	42,285	8,457	16	123,569	7,723	29	121,483	4,189
7151020	Drilling Machines	15	261,178	17,412	117	547,291	4,678	145	828,146	5,711
7151030	Milling Machines	168	789,055	4,697	527	2,002,120	3,799	685	4,551,620	6,645
7151040	Boring Machines and Vertical Turret	26	513,252	19,740	76	1,380,626	18,166	89	2,887,347	32,442
7151050	Lathes except vertical Turret Lathes	1,201	3,111,063	2,590	2,105	7,705,081	3,660	2,726	11,326,825	4,155
7151060	Grinding Machine	347	843,122	2,430	698	1,557,668	2,232	850	2,256,056	2,631
7151070	Machine Tools, Metal-Cutting not elsewhere Specified	990	1,169,551	1,181	3,280	2,822,156	860	3,780	6,760,877	1,789
7151080	Machine Tools, Metal-Working not elsewhere Specified	412	1,016,619	2,468	642	1,736,806	2,693	733	4,137,750	5,218
	Total:	3,164	7,746,125	2,448	7,461	17,867,519	2,395	9,097	32,860,084	3,611

Appendix 16 (Cont'd)

U.S. Imports of Metalworking Machine Tools for Consumption by Country and Type, 1965-67

FROM WEST GERMANY

SITC	Product Description	1965			1966			1967		
		Number	Value \$	Average value \$	Number	Value \$	Average value \$	Number	Value \$	Average value \$
7151010	Machine Tools for cutting or hobbing Gears	84	2,308,310	27,480	129	1,659,744	12,806	135	2,536,113	18,786
7151020	Drilling Machines	122	259,940	2,131	329	915,410	2,792	479	1,659,452	3,423
7151030	Milling Machines	307	2,143,404	6,992	415	4,679,996	11,277	534	6,243,592	11,692
7151040	Boring Machines and Vertical Turret	75	1,017,712	21,569	190	4,205,596	22,125	271	6,521,577	23,544
7151050	Lathes except vertical Turret Lathes	1,088	2,939,280	2,702	1,925	7,273,434	4,090	1,458	8,555,017	5,936
7151060	Grinding Machine	1,097	2,051,735	1,870	1,886	4,453,888	2,362	1,497	4,817,592	3,219
7151070	Machine Tools, Metal-Cutting not elsewhere Specified	3,279	3,972,148	1,191	17,878	6,260,089	350	4,158	9,079,005	2,184
7151080	Machine Tools, Metal-Working not elsewhere Specified	1,444	4,251,611	2,930	1,534	5,248,324	3,421	1,742	11,034,097	6,334
	Total:	7,514	19,424,140	2,585	24,286	55,294,171	1,453	10,274	50,525,225	4,918

Call Report

Appendix - 17

Name

Follow Up Date

Street Address

City

Zone

State

Reason for Call		IN CONFERENCE (Hrs.) (Min.)	Territory	Salesman	Date
Requested Follow up	Coverage				
1. Persons Seen	Title Mailing List	Add Remove Change*	2. Persons Seen	Title Mailing List	Add Remove Change*
3.			4.		

* Changes of Existing Names, Titles, Company or Address only.
Please furnish adequate before-and-after information

Results of Call

Lost Business Report

CUSTOMER	Territory Date
Address	Approximate Date of Purchase
Machine we quoted	Price of Machines and Equipment
Machines Purchased, Number, Exact Description of Size, etc	
Price of Machines and Equipment only	Check whether ☐ New☐ Used☐ Rebuilt
Describe fully, but concisely, reasons for loss of order	
How would you classify reason for loss of this business? Check	
How many calls have been made in past year ?	

Delivery-specify	Design	Interchangeability	Friendship and reciprocity	Price	Not able to offer proper machine	Not Informed	Outsold

Mail At once to _____

Salesman _____

COVINGTON & BURLING
UNION TRUST BUILDING
WASHINGTON, D.C. 20005

April 30, 1968

MEMORANDUM FROM LEGAL COUNSEL TO AMERICAN
MACHINE TOOLS DISTRIBUTORS' ASSOCIATION

Forms of Builder-Distributor Agreements
in the Machine Tool Industry

Many builders and distributors are currently reviewing and in many cases revising their builder-distributor agreements. This is in part an outgrowth of discussions stemming from last year's Schwinn decision by the United States Supreme Court. It also reflects an increasing awareness by builders and distributors of the important business and legal significance of the terms of the builder-distributor relationship.

This memorandum describes in a general way some of the major considerations bearing upon the form and content of the builder-distributor agreement.

1. Why a Modern Written Agreement

More and more builders and distributors are recognizing the wisdom of expressing their relationship with one another in writing, clearly and in simple language, as free as possible of legal ambiguities. In this way misunderstandings and legal difficulties that otherwise could arise, and not infrequently do, despite the best intentions and good relations over a long period of time, usually can be avoided.

Unfortunately many distributor agreements have been prepared without the assistance of counsel and without a full appreciation of the relevant tax, legal and business considerations. In some cases distributor agreements utilize forms that are not appropriate in the light of important recent legal developments, changing industry conditions or other relevant considerations. In other cases agreements are patched together from a variety of sources resulting in gaps, ambiguities or inconsistencies.

Appendix 19 (continued)

Still common in the industry are oral agreements, which in many cases cover no more than the bare essentials a commission or discount rate and an area of sales responsibility. Of course, no one would dispute that the most important element in a successful, enduring builder-distributor relationship is the mutual trust of the parties and the effective performance by each of his basic responsibilities. But this does not mean that a written agreement is unwise or unnecessary. Indeed, if the parties really understand and value their relationship, there would seldom be any reason not to state it in writing.

The absence of a written arrangement, contrary to what is sometimes assumed, provides no insulation from possible antitrust problems. The courts do not condone an illegal understanding merely because it is unwritten. Indeed, from an antitrust standpoint, the absence of a written agreement is sometimes positively damaging. It may create an inference of an illegal arrangement, such as fixed customer territories or controlled customer prices in a buy-sell distributor relationship. This is especially so if past practices have varied from present legal standards. Moreover, in the absence of written guides the builder and distributor can unwittingly fall into a pattern of conduct that creates unnecessary legal problems or risks.

2. Types of Builder-Distributor Agreements

Builder-distributor agreements fall generally into one of two categories, though there are of course hybrid arrangements.

The first is the "buy-sell" type. The distributor buys for his own account and resells to the customer. The distributor pays the builder from his own funds and takes the risk of any customer default.

The second basic type of agreement is the "representative" type. Here the distributor acts as agent for the builder. The distributor solicits orders from customers and forwards those orders to the builder, who accepts and fills them and normally takes the customer credit risk. The distributor is compensated by a commission, usually a percentage of the selling price.

In most cases, under either type of agreement, delivery is made from the builder's plant directly to the customer. Also, in most cases, the distributor is entirely independent of the builder in an ownership sense. The distributor generally owns his own business premises or leases them from someone other than the builder. Normally, too, the distributor will carry machine tool lines of a number of builders.

Appendix 19 (continued)

There are important differences in the legal characteristics of the two basic types of distributor agreements. Each has its own advantages and disadvantages, and neither type is preferable in all situations. The choice between the two will depend upon the respective interests of the two parties. The following table sets forth some of the principal differences in the two types of agreement, in terms of the rights and obligations of the parties between themselves and with respect to others.

A. Selection of Customers

Buy-Sell
Distributor Arrangement

The selection of customers is made by the distributor. Any attempt by the builder to reserve to himself or to particular distributors certain customers or customers in certain geographic areas would be unlawful under the Schwinn case. However, the builder can (1) grant the distributor an "exclusive" franchise by agreeing not to sell directly to customers or to certain classes of customers located in a particular geographic area served by the distributor and not to sell to other distributors located in that area, (2) give the distributor "primary responsibility" for developing sales and servicing machines in a particular geographic area and judge the distributor's performance and continued affiliation with the builder on the basis of the distributor's sales in that area, and (3) compensate the distributor for his work in his area of primary responsibility by awarding him an appropriate

Manufacturer's
Representative
Distributor Arrangement

A distributor under a manufacturer's representative type of agreement sells as an agent of the builder, not as a seller in his own right. Accordingly, it is probably still permissible, in the absence of special circumstances, for machine tool builders to impose geographic or customer restrictions on such distributors. But any such arrangement should be closely scrutinized by legal counsel. Before giving his legal approval, counsel will have to consider carefully all aspects of the particular builder-distributor relationship and analyze the overall business context in which the agreement is made. Schwinn is only one of several recent decisions that suggest important theoretical and practical limitations on the once broadly accepted right of manufacturers to control the distribution of their products through agency selling arrangements. Among the factors that may affect counsel's recommendations with respect

Appendix 19 (continued)

commission on sales made by other distributors to customers located in that area.

to possible customer restrictions are the extent to which the distributor performs functions other than merely -soliciting and forwarding orders, the availability in the distributor's area of competitive products from other sources, the builder's position in the industry and the competitive problems faced by him, the nature of the distributor's overall business activities, the builder and distributor's manner of doing business in the past, and the parties' primary reasons for including customer restrictions in their agreement.

B. Customer Prices

The builder cannot control the prices at which his distributor sells to customers. This was a well established legal principle before the Schwinn case and was reaffirmed in that decision. The builder may have suggested list or customer prices but any attempt to coerce distributors to sell at such prices by threatening to terminate the distributorship or otherwise would be unlawful.

As in the case of customer selection, where a true agency relationship exists between builder and distributor under a well drawn and faithfully followed representative-type distributor agreement, the builder is theoretically free to determine the price at which he will sell machine tools in response to orders solicited and forwarded to him by his distributor. But the cautions and caveats noted in connection with customer selection provisions are at least equally applicable to provisions relating to customer prices, perhaps more so. No agreement under which the builder retains the right to determine customer selling prices should be entered without a careful analysis by counsel of all the surrounding facts, including those that

Appendix 19 (continued)

would be analyzed in connection with any proposed customer-selection provisions.

C. Other Customer Terms and Conditions

The builder can, by contract with the distributor, limit those builder warranties that the distributor is authorized to pass on to the customer. But the builder cannot otherwise attempt to control terms which have possible competitive significance such as, besides price, terms of payment, standards for accepting the customer's credit, possible distributor warranties, etc.

The builder generally can control the terms and conditions of sale to the customer. Often this is accomplished by authorizing the representative to use only the builder's quotation from containing these terms and conditions, and by reserving to the builder the right to accept the customer's order. But to the degree that other terms and conditions have competitive significance, factors that may operate to limit the builder's right to set the selling price theoretically may also limit his right to establish other terms and conditions.

D. Sales of Competing Lines

To avoid antitrust difficulties a builder should not require his distributors not to deal in competing lines. However, the builder, in choosing and in continuing an arrangement with a distributor, may properly evaluate the distributor's effectiveness in selling the builder's products. In many instances it is very difficult for a distributor effectively to promote two machines that are directly competitive.

Where counsel concludes that customer selection or price controls can be justified because of the agency nature of the relationship and the absence of special countervailing circumstances, he would probably also approve the builder's insisting that the distributor not handle any lines that would compete with the builder's. But if the obligation of exclusivity significantly deprived other builders of access to particular markets, such a provision might be subject to attack.

E. Risk of Loss in Transit

Most machine tools are shipped directly to the customer from the builder's plant. Whether the risk of loss shifts from the builder prior to delivery and acceptance by the customer is a matter to be resolved in the contract documents. The distributor may take title from the builder and assume the risk of loss at the builder's plant but this does not have to be the arrangement. Where the distributor buys for stock, title and risk of loss normally will pass to him upon shipment or, depending upon the contractual provisions, upon his receipt of the machine.

The representative distributor, by definition, does not assume the risk of loss in transit. That risk will be either upon the builder or the customer, depending upon the terms of the sale.

F. Risk of Customer Default

The distributor will normally be responsible to the builder for the price of the machine whether or not the customer pays. Normally the distributor will bill the customer himself.

The builder's representative will not normally be responsible to the builder for any default on the customer's part except that, depending upon the arrangement, his commission may be cancelled in the event the sale is rescinded for default or any other reason. Normally the customer will be billed directly by the builder, although the distributor can serve as collection agent for the builder.

G. Product Liability

The builder will be liable to customers for personal injury or property damage and in some cases so-called "consequential" damages resulting from negligent manufacture. Where the distributor performs installation or service functions or recommends complementary equipment, tooling or attachments, he may face claims based on his negligence. In addition, both the builder and the distributor will generally be liable for damages resulting from failure of the product to perform in accordance with accepted industry standards or with representations or warranties made to the customer. In some states the expanding doctrine of "strict liability" (liability without fault) may result in liability of the builder and distributor on little more than a showing that the machine caused injury or property damage. To some.

A builder selling through a representative type distributor may be liable to customers to a somewhat greater degree than builders selling through buy-sell distributors. To the extent that state law may make "privity" (a direct contractual relationship between plaintiff and defendant) an essential ingredient of product liability, builders selling through agents may be liable to customers in circumstances where those selling through distributors who take title would not be. Also, the likelihood of a builder's being held liable for failure of the machine to conform to oral representations by the distributor is greater in the case of a builder selling through a representative type distributor. Of course, a builder may by contract shift to the distributor possible liability resulting from breach of any express

extent both builder and distributor can reduce their product liability exposure by communicating to the customer appropriate disclaimers, by indemnification provisions in sales agreements and by insurance. Also, the builder and distributor can, in their own agreement, provide for an equitable division between themselves of the ultimate burden of particular types of product liability claims.

warranty that the distributor was not authorized to make, or from negligence by the distributor in the performance of any of his functions. In the absence of special contractual arrangements, a representative type distributor normally has correspondingly less ultimate product liability exposure than the distributor who buys and sells for his own account. But distributors selling as agents for distant or judgment-proof builders may in some cases be unable to shift the burden from themselves, even where the builder is clearly primarily liable.

H. Builder's Exposure to Taxes and Laws of Customer's Jurisdiction

The builder generally will not be subject to the laws of the customer's jurisdiction if he is not engaged in business there himself. However, if the builder employs service personnel in the customer's state or conducts other business there, he may become subject to local taxation, be amenable to suit and, in some states be unable to bring suit unless he qualifies to do business locally.

The builder generally will be subject to the laws of the customer's jurisdiction to the same extent as if the builder were selling directly to the customer through employee-salesmen. In most cases this will mean exposure to state or local sales or use tax and, depending upon whether the distributor has an office in the state or employs service personnel there, possible exposure to other local taxes, including state income tax. Even if the distributor does not have any such contacts with the customer states, the builder may be subject to suit under state "long arm" statutes, which in some cases give jurisdiction over out-of-state sellers who sell into the state.

I. Distributor's Exposure to Renegotiation

The distributor who sells for his own account generally will have less exposure to renegotiation of profits on renegotiable Government business than a representative-type distributor. This is principally because the statutory annual renegotiation floor for a buy-sell distributor is \$ 1,000,000 of renegotiable sales volume, and he may claim the new durable productive equipment and standard commercial article exemptions. Also, because a buy-sell distributor assumes greater risks he may be able to justify a higher return on renegotiable sales.

The representative distributor has a statutory renegotiation floor of \$ 25,000 in commissions. At a 5% commission rate this would represent a sales volume of only \$ 500,000, half the statutory floor for a buy-sell distributor. At a 10% commission it would represent volume of \$ 250,000, one quarter of the statutory floor for buy-sell distributors.

3. Provisions in Builder-Distributor Agreements

The following is a brief checklist of some of the principal matters that may be covered in a well-drafted builder-distributor agreement. This list is not intended to be necessarily all-inclusive. Some builders and distributors may have other matters to cover in their particular situations. No attempt is made here to draft provisions appropriate for each item listed. This is a job for individual counsel for the parties, after negotiation of any points on which there may be differences between them.

A. Products Covered by Agreement. The agreement should specify which of the builder's products or product lines are covered and whether parts and accessories are included. Often this is accomplished through a schedule attached to the agreement, a procedure that facilitates changes. The agreement should specify the conditions and manner in which any changes may be made in the covered products.

B. Distributor's Sales Responsibility. The agreement should clearly indicate whether the distributor is in a buy-sell or manufacturer's representative relationship with the builder. If the distributor is a manufacturer's representative, the agreement should indicate what

authority he has to negotiate or complete sales for the builder, including his authority to set prices and other terms and conditions of sale, his obligation to use prescribed forms, and whether the builder reserves the right to accept or reject orders. If the distributor has a buy-sell relationship with the builder the builder may not prescribe the distributor's price and terms but may limit to some degree the warranties the distributor may pass on.

C. Distributor's Promotion and Servicing Responsibility. The agreement should specify clearly the distributor's responsibilities for promoting the builder's products and for servicing them, both with respect to geographic area and the character of the services to be performed.

D. Distributor's Compensation. The agreement should clearly specify the distributor's compensation, whether expressed as a percentage or dollar discount from suggested customer prices or, in the case of manufacturers' representatives, a stated commission. Where compensation is based on a percentage of price, the agreement should clearly define the price to which the percentage is to be applied, indicating whether it includes or excludes such items as crating, freight, insurance, taxes etc. The manner and time in which compensation is payable should be specified. The extent to which the distributor's compensation may be reduced on a sale outside his area of primary responsibility or the distributor becomes entitled to some compensation on a sale by another distributor into his area of responsibility should be made clear and kept within permissible legal limitations.

E. Other Distributor Terms. In the case of a buy-sell agreement the terms of sale to the distributor should be clearly set forth, including builder warranties, product liability indemnification, protection against patent infringement and the like. Provisions covering these matters may also sometimes be included in representative agreements. Ideally the agreement should impose on each party a degree of exposure appropriate to his function, taking into account his compensation or profit, his capabilities and competitive conditions.

F. Distributor's Protection. The extent of any distributor protection offered by the builder should be defined and kept within legal limitations. In the buy-sell agreement this generally may include protection for the distributor against the appointment of another distributor within a prescribed geographic area or against direct builder sales to customers in such an area or to particular customers or classes of customers.

Appendix 19 (continued)

G. Duration and Cancellation. The agreement should have a definite term and should specify precisely the conditions under which it will be renewed or extended. The circumstances under which the parties can terminate the agreement and the procedures to be followed should be made clear. The rights of the parties on expiration or termination, including any rights of the distributor to complete or make sales within a stated period of time after expiration or termination or otherwise, should be specified. Provision should be made for the disposition of inventory, sales materials and other property furnished by the builder that may be in the distributor's possession at the time of termination.

H. Assignment. The agreement should state the conditions, if any, under which it can be assigned by either party. A common provision is to permit assignment to any successor to substantially all of the business and properties of the party but in some situations even this limited right to assign may be inappropriate.

I. Governing Law. To eliminate uncertainty as to the law governing the rights of the parties, it is generally desirable to specify the state whose law is to govern interpretation of the agreement.

COVINGTON & BURLING.

TERMS AND CONDITIONS OF SALE
IN THE MACHINE TOOL INDUSTRY

By U.S. National Machine Tool Builders' Association

Purpose and Scope

The use of a form of "Terms and Conditions of Sale" has become fairly standard throughout the machine tool industry. These forms are ordinarily preprinted, either on separate sheets or on the back of a quotation form, and cover items ranging from delivery terms to warranties. Because of the prevalence of these forms and a widespread lack of understanding of their proper use and importance, the Sales and Service Committee of the NMTBA conducted a series of seminars in the spring of 1966 at which legal counsel made a presentation of this topic. These seminars pointed up some of the key industry problems regarding terms and conditions of sale and provided the background material for this summary by legal counsel.

This memorandum does not attempt in any way to suggest uniform forms for terms and conditions. Both legally and from the standpoint of sound management, terms and conditions of sale are a matter for individual company decision. Moreover, the industry is too varied and the problems of individual companies are too diverse for any uniform form to be either practicable or desirable.

The various sample clauses set forth and discussed in this memorandum are not intended as the last word in form provisions or even as the best provision for any segment of the industry. In many instances these sample provisions are merely examples of existing industry practice, and they are intended only as guides to provide a framework for each company to consult with its own company counsel regarding the best provisions for its particular situation. Throughout this memorandum emphasis will be placed on changes under the Uniform Commercial Code (UCC), a comprehensive modern revision and condification of commercial law which has now been adopted in every major commercial state.

It cannot be stressed too strongly that consultation with individual company counsel is imperative. A form of terms and conditions involves almost every aspect of the law of sales and contracts and many aspects or related fields, all of which vary from state to state. A memorandum such as this cannot hope to do more than

touch on the highlight problems of general interest throughout the industry. Many matters which may be crucial to your company may not even be discussed in this memorandum.

"The Battle of the Forms"

The reasons for use of forms of terms and conditions are reasonably well understood by most companies. The forms are designed to lead to certainty in contractual dealings by pinning down many of the details of a sale which might otherwise be overlooked. This certainty in turn lessens the possibility of later dispute or misunderstanding between the parties. Another purpose of the forms is to strictly define and limit the seller's responsibilities under a sale contract.

Unfortunately, the actual use of these forms is often contradictory to their purposes. In common practice a seller despatches his form, the buyer despatches a completely different form, and little or no attempt is made to reconcile the differences. In these circumstances, the preprinted forms may well lead to more rather than less uncertainty and will often be entirely ineffective in protecting the seller's rights.

The UCC recognizes the practical realities of this so-called "Battle of the Forms" and attempts to set down rules which will introduce a greater degree of certainty into the situation where a buyer sends in an order, accompanied by a preprinted form of terms and conditions, and the seller sends a regular written acceptance and acknowledgment of the order, the seller will be bound by the buyer's preprinted form. Any material variation in a preprinted form sent by the seller with his acceptance will not be effective unless the buyer agrees to it.

The most reliable way for a seller to avoid becoming bound by the purchaser's preprinted form in this situation is for the seller to expressly state in his acceptance that the acceptance is entirely conditional on the buyer agreeing to the seller's preprinted form. But this strongarm approach, of course, runs the risk of alienating a valuable customer.

This is only a brief glimpse at the rules laid down in the UCC to govern the "Battle of Forms." Each company would be well advised to review carefully its practices in handling preprinted forms to make certain that it is taking full advantage of its own form and that undesirable provisions in the buyer's form are not unwittingly being accepted.

Once procedures for handling preprinted forms are properly established, the next step is to review the various terms and conditions in the form.

Delivery Terms

1. Risk of Loss -- The first point to consider under delivery terms is the matter of risk of loss or damage during shipment of a machine, a point normally covered in an F.O.B. provision. Shipment can be either "F.O.B. shipping point," in which case risk of loss passes to the buyer as soon as the machine is delivered to the carrier, or "F.O.B. destination," in which case the seller retains the risk until the machine arrives at the buyer's plant. The problems of certain residual liabilities involved in the two types of F.O.B. provisions were discussed in the recent NMTBA Bulletin No. 66-17, "Insurance Coverage for Risk of Loss," and need not be repeated here. Particular attention should be given to the insurance problems discussed in that bulletin and the suggested provision on page 11 of the bulletin.

A typical F.O.B. shipping point provision would simply read:

"All shipments are to be made F.O.B. Seller's plant in Tooltown, Ohio."

An F.O.B. destination provision might read:

"All shipments are to be made F.O.B. Buyer's plant at the destination shown on the attached quotation."

2. Avoiding liability for late delivery - Delivery terms often also include provisions to avoid liability in the event machines are not delivered on the precise date quoted. There are two aspects to this late delivery question - delays because of intervening causes beyond the seller's control and delays due to scheduling problems or related factors which the seller, arguably, is able to control.

In cases beyond the seller's control, it is fairly common for a seller to ask for a complete release from liability. This clause might cover failures of suppliers as well as fires and strikes. Typical provisions read:

"All scheduled delivery dates are subject to delays caused by civil insurrection, war, fire, strike, Acts of God, shortages of materials or failure of suppliers or subcontractors to satisfactorily meet scheduled deliveries or any other factor or event beyond Seller's

control, none of which factors or events shall give rise to any liability on the part of Seller."

"Seller shall have no liability for loss or damage resulting from a delay in scheduled delivery caused by war, riots, strikes, labour disputes, fires, serious accidents, delays in receipt of parts or materials from suppliers or subcontractors, natural disasters or any other circumstances beyond Seller's control."

The foregoing provisions do not cover the potential problem of delayed deliveries resulting from rescheduling made necessary by Government priorities. The Government priority problem was fully discussed in NMTBA Bulletin 66-27, April 27, 1966, which contains typical contract provisions used to deal with this aspect.

The situation is not so clear in cases where the cause of the delay is arguably within the seller's control. To deal with this problem contracts may provide that scheduled delivery dates are only approximate. Beyond this, the extent of the protection sought is a matter of good business judgment. Typical provisions used in the industry are:

"The quoted delivery date is approximate."

"The quoted delivery date is only an estimate based on present scheduling requirements and may be deviated from by --- days or any reasonably longer period at seller's discretion."

Installation Terms

The need for spelling out the installation responsibilities of buyer and seller is something that is often overlooked in terms and conditions of sale. In the case of many machine tools installation may involve a substantial expense which the seller will want to avoid. On the other hand, the seller might feel it necessary to install the machine tool in order to be sure it is done right. The seller may wish only to consult on the installation. In any event, it is clear that this decision cannot be safely deferred until the machine tool is delivered. Typical installation provisions might include:

"On being expressly requested to do so by Buyer, Seller will provide technical personnel to aid in the installation, testing and demonstration of the machine. These services shall be wholly chargeable to Buyer at the rate of \$ _____ per day plus travel and living expenses."

"Seller will furnish a technically qualified service engineer to consult on installation and initial testing of the machine free of charge for a period not to exceed _____ working days. All further costs of installation, including the furnishing of workmen, proper foundations and power supply lines, and the costs of furnishing a service engineer beyond such _____ day period, shall be borne by Buyer."

"The price quoted includes all costs of installation and initial testing necessary to place the machine in suitable condition for ordinary use in Buyer's plant."

Cost Increases and Taxes

1. Escalator clauses - During a period of long order backlogs and rising prices such as is now current, it may be wise to consider obtaining contractual protection against increases in the seller's production costs. Clauses providing such protection may take a variety of forms. In the Italian machine tool industry, all prices are subject to escalation under a lengthy algebraic formula involving three major factors - the price of iron castings, the price of hot-rolled steel, and the wage-scale index. This is probably too technical to gain much acceptability in American markets.

One fairly common approach is to provide for a general escalation without rigid formulas but with a firm limit on the total amount of escalation. Such a clause might read:

"If the shipping date specified for any item is _____ days or more from the date of order, Seller reserves the right to increase the price charged for that item in order to reflect increases in the cost of materials, supplies or other goods purchased by Seller; provided however, that the total of such increases in the price of any item shall not exceed _____% of the price quoted for such item in the proposal."

Another possible approach is to tie all prices in to the price list that is in effect at the time of shipment. Such a provision, which would seem useful primarily to a company making fairly standard catalog items, might read as follows:

"In the event that the delivery of any item takes place more than _____ months from the date of order, the price charged will be that in effect in Seller's published catalog and price list as of the shipping date."

In some cases it may not be feasible to cover all increases, but only increases in the costs of high-priced purchased components separately charged to the customer, such as N/C systems. In these cases, the following provision might be useful:

"The price quoted for any component or assembly not manufactured by Seller is based on the prevailing price paid by Seller for such component or assembly and any increase in such price paid will be passed on to Buyer."

Some buyers, of course, may not be willing to accept an escalation clause which, in effect, puts them in the position of making a purchase without complete certainty as to the price. This buyer reluctance can be offset to some extent by a percentage limitation on the amount of escalation, as suggested in the first clause above. Another possibility would be to give the buyer the right to cancel his order in the event of any substantial price increase. This right could be stated as follows:

"Buyer shall be notified in writing of any increase in price pursuant to this price revision clause and within _____ days after receipt of such notice Buyer shall have the right by sending written notice to Seller to cancel his order without any cost or obligation to either Buyer or Seller. In the event that such written notice of cancellation is not received by Seller within _____ days, Buyer shall be deemed to have agreed to such increased price."

2. Sales and use tax - Because of the myriad of sales and use taxes applied by the 50 states and by local jurisdictions, it is often impossible for a company to determine at the time an order is accepted all of the taxes which may be applicable to a

single sale. Yet, a company may well be liable for collecting such taxes, even in states where the company's operations are limited to selling through travelling salesman. Moreover, these taxes may be assessed years after a shipment in a surprise audit by the state or local government. To provide security in the face of these possibilities, the contract may place ultimate sales tax responsibility on the buyer. A sample contract provision relating to sales and like taxes is:

"Sales, use, excise, property or similar taxes arising out of or relating to this order or the goods delivered are not included in the price except as otherwise specifically stated in the invoice. All such taxes are the responsibility of the Buyer. The Seller shall have the right at any time to separately bill the Buyer for any such tax which the Seller may be called upon to pay."

Proposed legislation is now being considered by Congress which would restrict the power of states to tax companies not having an office or plant in the state and would cut short the possible liability for unassessed back taxes. Even if the proposed law were enacted in this session of Congress, which is by no means certain, however, a substantial area of potential surprise taxes will remain.

Payment Terms

1. Regular payment - The most obvious aspect of payment, and one that is covered in most terms and conditions forms, is the date fixed for payment on an invoice. A typical provision reads:

"Net payment in full on all invoices is due _____ days after shipment."

In some cases, a cash discount is offered for more prompt payment.

2. Progress payments - Another approach sometimes used is progress payments, i.e., partial payments at various stages of the manufacturing process with the balance due shortly after shipment. Progress payments are most frequently utilized where there is a need for credit protection, where a machine tool is being custom-made and cannot be diverted easily to any other buyer in the event the original buyer defaults, or where a builder is in need of capital funds due to long lead times. A progress payments provision might read as follows:

Appendix 20 (cont'd)

"In the event that the total price quoted exceeds \$ _____ progress payments shall be due and payable prior to shipment under the following schedule:

_____ % payment shall be submitted with the order.

_____ % payment shall be due and payable on notice from Seller that approximately one half of its costs of manufacture under the order have been paid or incurred.

_____ % payment shall be due and payable on notice from Seller that the order has been completed and is ready for final testing.

Balance of payment shall be due and payable _____ days after shipment."

3. Late payments - In some situations prompt payment according to the terms of the order may not be forthcoming. In such situation, the seller is in a stronger position if his terms and conditions provide for interest on overdue payments. For example:

"Any account unpaid _____ days after shipment is subject to a service charge of _____ per cent per month on the unpaid balance."

Interest is, of course, only a partial remedy for an overdue payment and it is of little value in a situation where the buyer fails after receipt of the machine. In most cases, a seller of a machine is in little better position than any other creditor when a buyer fails. If the seller has some suspicion that the buyer's financial condition may be unsound, a conditional sales arrangement or some other form of secured transaction may be used. These secured transactions are most common where a buyer is making deferred payments over a substantial period after shipment.

Warranties and Product Liabilities

There are two sides to the warranty problem. On the one hand there is the selling side - a buyer expects a manufacturer to stand behind his product and the manufacturer is normally anxious to do so. On the other hand there is the ever present danger of increasing exposure to liability claims, which a manufacturer wishes to limit to the extent possible.

Two basic steps may be taken to reconcile these competing considerations: First, the seller can carefully limit and define the extent of all warranties, what is being promised. Second, he can carefully limit and define what will be done in the event the warranty is not kept. The second step is often overlooked and yet is just as important as the first.

1. Limiting Warranties - Warranties fall into two principal classes, express and implied.

"Express" warranties are any promises or statements of fact which a buyer relies upon, whether made in the quotation or in prior oral or written communications. They may include blueprints or specifications furnished by the builder, a statement of production capabilities, or, perhaps, even a name for an item, as where a wheel is designated "un-breakable." In the case of any express warrant, the seller is liable for assuring that the products meet the specifications or standards warranted.

Implied warranties are created by law and exist even if no statement or representation is ever made by the seller. There are two of these implied warranties. The first is the implied warranty of "merchantability", which is a warranty that all products are fit and acceptable for use in performing their normal functions. The second is the implied warranty of "fitness for a particular purpose," which is a warranty that the product will meet special requirements of the buyer. Unless specifically disclaimed, the first implied warranty arises in all sales, the second only in cases where the buyer's particular requirements have been made known to the seller.

The type of warranty which is usually stated in a form of terms and conditions is a kind of express warranty. To minimize the risk of unforeseen liability, this warranty should be very definite in what it covers. The period of the warranty should be stated specifically. If certain maintenance is required on the machine, the warranty should be conditioned on satisfactory compliance with maintenance requirements. If the warranty is not to cover purchased components manufactured by other companies, the exclusion of such purchased components should be clearly stated.

Typical warranty provisions read as follows:

"New products manufactured by Seller and warranted to be free from defects in materials and workmanship for a period of ____ months from date of shipment (____ months if used only in single shift operation) provided

items have had normal and proper usage and are still the property of the original purchaser."

"Seller warrants to the original purchaser of all products manufactured by it that such products will be free from defects in materials or workmanship for a period of (i) _____ months from the date such products are shipped from its plant, or (ii) _____ hours of actual operation, whichever is shorter, said warranty to remain in effect if and only if such products are used in accordance with all instruction as to maintenance and operation set forth in manuals and instructions sheets furnished by Seller. In no event shall this warranty be deemed to cover or obligate Seller in any way regarding items or components not actually manufactured by it."

If a seller wishes to limit his liability to this expressly stated warranty, it is important that he take steps to avoid implied warranties and unascertained express warranties. The scope of these other warranties is always uncertain and the legal interpretation of what constitutes a violation may not coincide with the seller's intentions. Fortunately, there are devices which are effective in disclaiming unintended warranties in most cases.

All express warranties (except the actual description of the product and others which are specifically desired) can normally be disclaimed with a clause in the terms and conditions which clearly and explicitly states that no express warranties are made. One area of particular concern in the machine tool industry involves representations of production capabilities, and, if these are not to be warranted, it would be prudent to enter a specific disclaimer.

It is also desirable to avoid specifically any implication that prior oral statements may constitute a warranty by providing that the written quotation plus the written terms and conditions constitute the full agreement of the seller and buyer. This point is discussed more fully below.

Implied warranties can also be avoided by an appropriate disclaimer clause. However, there are a number of specific rules governing disclaimers of implied warranty which must be strictly complied with in order to make the disclaimer effective. In the case of the merchantability warranty, the disclaimer must contain the word "merchantability," must be in writing, and must be conspicuous. In the case of the fitness warranty, the disclaimer must be conspicuous. In both cases, "conspicuous" is normally interpreted to mean in larger type or in a brighter colour.

Typical warranty disclaimer clauses, covering both express and implied warranties, read as follows:

"THE WARRANTY STATED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OR MERCHANTABILITY OR OTHERWISE, and of all other liabilities and obligations on our part, and we expressly deny the right of any other person to incur or assume for us any other liability in connection with the sale of a machine by us."

"THE WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY. No promise or affirmation of fact (including but not limited to statements regarding capacity or performance of a machine) shall constitute a warranty by Seller or give rise to any liability or obligation of Seller."

2. Limiting liabilities on warranties: Consequential damages — As mentioned above, it is just as important to spell out the scope of liability under a warranty as it is to spell out the warranty itself. This is normally done by stating in positive terms exactly what responsibility the seller will have if the machine does not live up to the warranties, and disclaiming any other bases for liability.

For example, in the common case where the warranty covers defects in materials and workmanship, the seller might state how such defects will be remedied and whether or not the seller will pay shipping costs and/or labour costs for installation.

After stating the express types of **recovery** to be granted to the buyer, the next step is to disclaim implied sources of liability which, like implied warranties, can be a dangerous trap for the unwary. The implied source of liability that must be given critical attention involves the area of "consequential damages." Consequential damages cover all those indirect and uncertain losses which may flow from a defect in a machine, including, for example, losses of production, personal injury to workmen and damage to work pieces. The UCC permits a seller to disclaim liability for consequential damages in most instances.

In addition to spelling out a remedy and limiting liability for consequential damages, there is another step which should be taken. The UCC provides that limitations on warranty remedies will not be effective in any case in which the limitation causes the warranty to fall "of its essential purpose." In such situations,

a seller may find himself with no contractual limitation at all on the remedies available to his buyer. In order to guard against this possibility, it is desirable to fix some overriding limitation which applies to cases where the regular limitations are inappropriate. For example, if a machine is warranted against defects in materials and the buyer's remedy is ordinarily limited to repair of defective parts, it might be desirable to provide that in the event the machine is not repairable, the buyer's remedy is then limited to a refund of purchase price.

Another matter which might be considered in drawing a remedy clause is the period of time for the buyer to bring legal action on breach of warranty claims. The normal period in most states for such action is four years, but the UCC permits the period to be reduced to one year by agreement of the buyer and seller.

The following are sample remedy clauses:

"Seller's liability under this warranty is limited to delivering to the buyer, F.O.B. Seller's plant in Tooltown, Ohio, replacements of any equipment or parts determined by Seller to be defective or repairing such equipment or parts determined by Seller to be defective. Seller's guarantee with respect to equipment manufactured by other will be the same as that of the manufacturer. In no event will Seller be liable for damages or injuries sustained as a result of defective workmanship or material in the equipment."

"Seller's obligation under this warranty shall be strictly and exclusively limited to furnishing labour and material required for repairing or replacing parts which are determined to be defective on inspection by an authorised representative of Seller. The determination of Seller's representative shall be final. Seller assumes no responsibility for reimbursing repair or replacement costs incurred without its prior written authorization or prior to a determination by its authorised representative. All costs of packing and shipping defective parts and/or replacement or repaired parts shall be paid by Buyer. If in any case Seller's authorised representative determines in his sole and final discretion that the nature of a defect precludes remedy by repair or replacement of parts, Seller

reserves the right to satisfy its warranty obligation in full by refunding the full purchase price on return of all products to it, freight prepaid. In no event shall Seller's liability under this warranty exceed the purchase price paid for the products. Seller shall have no liability whatsoever in any event for payment of incidental or consequential damages, including damages resulting in personal injury. Any action for breach of this warranty or other action under this contract must be commenced within one year after such cause of action arises."

3. Indemnity - No matter how well drawn the warranty and remedy clauses in a form of terms and conditions, there remains an area of potential legal liability which cannot be fully protected against - the area of so-called "product liability" for personal injury and property damage caused by defective or mal-functioning machines. The provisions of the UCC, if taken at face value, would extend substantial protection to a seller having a well-drawn form. However, the courts have developed a number of legal theories in recent years, notably the "strict liability" theory, which greatly expand the rights of an injured party to recover. These theories are likely in most instances to override the protections of the UCC.

The most common means of protecting against liability in this area is through use of product liability insurance. Such insurance offers broad protection and has become almost mandatory for machine tool builders in many product lines. All builders would be well advised to consult with their insurance carriers to be certain that their approach to product liability problems is coordinated to the maximum extent with insurance coverage.

However, even after taking product liability insurance into account, there remains a residual area of potential liability because of the limits of an insurance policy. In order to gain some measure of protection in this residual area (and also to reduce exposure in the area covered by insurance) it has been suggested by some authorities that a seller might seek a certain degree of indemnity from the buyer of a machine.

Under an indemnity clause a buyer would, in effect, act as an insurer of a machine's safe performance and reimburse the seller for damage claims he pays. Of course, it would be unreasonable to expect a buyer to offer the very broad protection given by an insurance company, but there are certain very limited areas where a buyer can quite reasonably be held responsible for potential damages and asked to compensate the seller when those damages occur.

The principal problem area where an indemnity clause might be appropriate and helpful concerns the matter of safety devices and instructions. It is often the case that a seller may include certain safety devices on a machine or institute safety procedures only to find that the buyer has ignored them. The contract may contain a provision whereunder the buyer in such cases will bear responsibility for any resulting injury.

A second area where indemnity might be appropriate is the matter of giving notice to the seller of accidents. Often a seller will find it impossible to defend a damage suit because he first learns of an accident when this suit is filed and several years have elapsed from the time of accident to the time of suit. A seller is in a much better position if he can learn of an accident as soon as it occurs so that he can make a proper investigation before witnesses have forgotten and other evidence has gone stale. Since the buyer of a machine will generally have knowledge of all accidents in his plant, the contract may require the buyer to indemnify the seller from later legal liability if the buyer does not pass on this information to seller.

There are, of course, many other areas where indemnity provisions may be appropriate. The following are two samples of clauses:

"Buyer shall use and shall require its employees to use all safety devices, guards, and proper safe operating procedures as set forth in manuals and instruction sheets furnished by Seller. Buyer shall not remove or modify any such device or guard or warning sign. Buyer shall not permit any person other than required operating personnel to remain within ten feet of any machine or accessory manufactured by Seller during operation thereof. If Buyer fails to strictly observe each and every one of the obligations set forth in this paragraph with regard to any of Seller's products, Buyer agrees to indemnify and save Seller harmless from any liability or obligation incurred by Seller to persons injured directly or indirectly in connection with the operation of such products."

"Buyer shall notify Seller promptly, and in any event within 30 days, of any accident or malfunction involving Seller's products which results in personal injury or damage to property and shall cooperate fully with Seller in investigating and determining the cause of such accident or malfunction. In the event that Buyer fails

to give such notice to Seller and so cooperate, Buyer agrees to indemnify and save Seller harmless from any claims arising from such accident or malfunction."

Cancellation of Order

Cancellation provisions can be a delicate subject for both buyers and sellers of machine tools. During relatively long time lag between order and delivery, a buyer's financial condition or production plans could change. The buyer may feel compelled to cancel his order in some such cases and the seller may recognise in certain circumstances that this is the only feasible choice. The builder is particularly vulnerable to loss arising from cancellation where special engineering and designing have been undertaken, or special devices have been constructed.

There are several contract provisions which the builder may wish to consider to deal with this situation. First, the builder may want to reserve the right to cancel or demand **additional** security from the customer under circumstances where this may appear necessary to avert a possible loss. Second, the builder will want to be fully protected through an appropriate damages provision against the buyer's cancellation.

To protect the seller against a buyer's possible insolvency or breach of the terms and conditions of sale, the following type of cancellation provision has been used:

- "(a) Following acceptance by the seller, this order may not be cancelled without the written consent of the seller.
- (b) The seller shall have the right to require that the buyer post adequate security for any or all payments due if a good faith doubt arises as to the buyer's ability to make prompt payment.
- (c) The seller shall have the absolute right to cancel and refuse to complete this order: (1) if at any time all terms and conditions governing this order (including any requirement of progress payments) are not strictly complied with by the buyer, (2) if at any time the buyer becomes bankrupt or insolvent, or (3) if the buyer fails to post

Appendix 20 (cont'd)

security as required by (b) above within _____ days after seller has requested the same. In the event of such a cancellation the seller shall have the right to indemnification for any or all costs incurred to the date of cancellation in performing the order (including the costs of any engineering studies and/or special patterns) and for the loss of profit resulting from such cancellation, which shall be deemed to be _____% of all costs subject to indemnification. The seller shall have the right, at its option, to waive its rights to indemnification with regard to any item scheduled for completion within _____ days following the date of cancellation and to complete such items and request full payment for same. The seller shall have no responsibility or liability to the buyer except for the return of any excess of the buyer's partial payments on the order less the foregoing costs and loss of profit."

Under the UCC the question of the buyer's ability to pay and the adequacy of security given by the buyer are to be determined "according to commercial standards." In particular cases, especially for very substantial orders, it may be desirable to spell out in the terms and conditions what security can be required of the customer and under what circumstances.

The formula for the seller's recovery in the event of cancellation by the buyer may be as simple or as complex as the builder's particular circumstances require. The same formula may be used for the seller's recovery as is used where the seller cancels as a result of the buyer's failure to post adequate security or breach of any of the terms and conditions of sale (see item (c) above). The following is another provision which might be considered, particularly where the contract calls for the delivery of a number of machines to be built over a period of time:

"In the event of cancellation by purchaser:

- a. Any items completed at time of receipt of written cancellation notice will be shipped and invoiced at the contract price.
- b. Work on the balance of the order will be stopped as promptly as reasonably possible and seller shall be reimbursed for all actual expenditures, commitments, liabilities and cost, determined in accordance with

good accounting practice, made or incurred with respect to such incompleted items, plus a profit of _____% on such costs, less any net recovery to seller on disposition of such items to others within a period of _____ days after the cancellation. Any items which the seller can use economically to fill other active orders will be restocked at a _____% handling charge."

Working Drawings

Where a builder provides working drawings or blueprints related to the machine tool on order, several potential problems can be avoided, or at least minimised, by carefully stating in the terms and conditions of sale exactly what will be provided and how it is to be used. Whether the seller wishes to provide working drawings at all, or perhaps require an additional charge for these materials, is strictly a matter of business judgment for each company. The first item, where drawings are to be provided, is to specify in the terms and conditions of sale the materials the seller intends to make available. A typical provision might be worded as follows:

"If requested in writing, the seller will furnish the following without charge:

- a. Blueprints or transparencies of tooling and fixture drawings.
- b. Blueprints or transparencies of machine foundation plans and hydraulic and electrical diagrams.
- c. Blueprints of proposed fixtures will be submitted for the buyer's approval prior to manufacture. Unless the seller is notified within _____ days of delivery of the blueprints, approval shall be presumed."

The next item relates to the use of drawings by the buyer. The seller may not wish to be bound to the exact specifications and designs set forth in the drawings, in which case he will want to make it clear that these drawings are provided only for informational purposes and are not part of the contract of sale. The following provision is one way to deal with this problem:

"All working drawings or other materials provided by the seller are for informational purposes only and the specifications contained therein are not binding on the seller except as expressly so stated in this form. The seller reserves the right to make, at any time, such changes in detail of design or construction as shall in the seller's sole judgment constitute an improvement over former practice."

The final item, probably the most important for many companies, relates to the secrecy of working drawings. Secret or confidential data concerning a builder's product often is revealed to a buyer in negotiations, during the building process or after delivery. In many cases, it is impossible to avoid some disclosure. While ordinarily the buyer has no interest in the data beyond his own use of the machine tool involved, there is still the risk that the buyer may make some use of the data which will aid the seller's competitors. Therefore, a builder may find it desirable to include in the terms and conditions of sale a secrecy clause which might read as follows:

"Any proposals, prints, brochures, drawings, or other information furnished to the buyer by the seller is intended for confidential use by the buyer, shall remain the property of the seller, and shall not be used to the detriment of the seller's competitive position."

Place of Contract

Specifying the place of contract in the terms and conditions of sale can be very important for both tax and contract reasons. Tax-wise, a company may be exposed to a wide variety of unexpected liabilities in the buyer's state if final acceptance is made there. This may be avoided by specifying that all orders are subject to final acceptance at the home office. As for contract law, each state differs, and some important provisions may be interpreted one way in the seller's state and another way in the buyer's state. In order to have maximum certainty, therefore, it is normally best to structure the terms and conditions of sale according to the law of the seller's state and then make sure all contracts are governed by that state's laws. This, as well as the previously mentioned objective of home office acceptance, might be accomplished by use of the following language in the terms and conditions of sale:

"All orders are made subject to final acceptance by the seller at its main office in Tooltown, Ohio. The plant of the seller in Tooltown, Ohio, shall be the place of performance where title passes to the buyer and payment becomes due. This agreement shall be an Ohio contract and shall be interpreted and administered for all purposes under the laws of Ohio."

Superseding or No---Modification Clause

A carefully drawn set of terms and conditions of sale may be of little value if outside arrangements or modifications, written or oral, made by agents of the seller are to be part of the contract. To avoid uncertainty on both the seller's and buyer's parts, it is wise to make it plain in the terms and conditions of sale exactly which documents are binding and what action will be necessary to modify the contract. The following clause might be considered for this purpose:

"The terms and conditions herein contained and any other terms and conditions stated in the seller's proposal or specifications attached hereto shall constitute the complete agreement between the seller and the buyer and shall supersede all prior oral or written statements of any kind whatsoever made by the parties or their representatives. No statement subsequent to the acceptance of this order purporting to modify the said terms and conditions shall be binding unless consented to in writing by a duly authorized agent of the seller in a document making specific reference to this order."

Arbitration Clause

Disputes over the meaning of contract terms and factual questions involving highly technical matters are bound to come up at some time despite the most comprehensive terms and conditions of sale. Costly and time-consuming court litigation is generally an unsatisfactory way to resolve commercial disputes, but in some cases it is the only resort.

An alternative, compulsory arbitration, is becoming popular in some industries. Of course, a requirement in the terms and conditions of sale that disputes be submitted to arbitration would

Appendix 20 (cont'd)

not compel the parties to arbitrate all disputes. The normal process of negotiating any disagreement when it arises would continue, with resort to arbitration if negotiations should fail.

A wide variety of procedures can be established in an arbitration clause. The seller may wish to exclude certain areas of potential disagreement from arbitration. Perhaps the seller will want to specify that all disputes not resolved by informal negotiations after a certain period of time will be submitted to arbitration upon the request of either party. In any case, it is important that a company consult with its counsel to be certain that an arbitration arrangement is in compliance with state laws and is well suited to the particular circumstances of the selling company.

Warner and Swasey Co. Deferred Payment and Rental Plans

DEFERRED PAYMENT PLANS

Example—Selling Price: \$ 10,000 Down Payment: (25%) \$ 2,500
Balance: \$ 7,500

	1-Year Term \$	2-Year Term \$	3-Year Term \$	4-Year Term \$	5-Year Term \$	6-Year Term* \$
Unpaid cash balance	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00
Finance charge	243.75	625.00	925.00	1,350.00	1,687.50	2,025.00
Time balance	7,743.75	8,125.00	8,425.00	8,850.00	9,187.50	9,525.00
Payable Monthly in						
1st year	645.00	338.00	234.00	301.00	257.00	229.00
2nd year		338.00	234.00	221.00	202.00	191.00
3rd year			234.00	142.00	156.00	152.00
4th year				73.00	101.00	114.00
5th year					49.00	76.00
6th year						31.00

(*) Terms longer than three years are made available under C.I.T.'s "pay as you depreciate" plan and are subject to their approval.

RENTAL PLAN

Can Be Written With or Without Option to Purchase

Year	Monthly Rental Rate	Option Price	Year	Monthly Rental Rate	Option Price
1	1½%	92%	5	1½%	40%
2	1½%	79%	6	1½%	27%
3	1½%	66%	7	½%	26%
4	1½%	53%	8	½%	25%

Lessee can cancel at the end of the fourth year and at the end of any subsequent year.

After seven years, Lessee may renew from year to year up to nine additional years. For such renewal periods the rate is ½% per month, and the option price is reduced 1% each year.

If option is provided, Lessee may purchase at the end of the first year and at the end of any subsequent year.

Appendix 21 (cont'd)

At the start of the contract, a 10% security deposit will be made. This deposit is held until the purchase option has been exercised or until Lessee cancels the contract and returns the equipment.

Rentals are paid quarterly in advance for seven years --then semi-annually.

Only standard machines, equipment and tooling will be rented. All special and perishable items must be purchased.

EXPOSITION REGISTRATION REPORT

ASTME
1967

AMERICAN SOCIETY OF TOOL AND
MANUFACTURING ENGINEERS
20501 FORD ROAD
DEARBORN, MICHIGAN 48128

SEE AUDITOR'S STATEMENT - ITEM 22

1. ASTME TOOL EXPOSITION, April 24-28, 1967
Name and Date of Exposition.
2. International Amphitheatre, Chicago, Illinois
(Location (Exhibit Hall(s), City and State)
3. American Society of Tool & Manufacturing Engineer
Sponsor
4. 20501 Ford Road, Dearborn, Michigan 48128
Address of Sponsor
5. Leonard Abrams
Exposition Manager
6. 20501 Ford Road, Dearborn, Michigan 48128
Address of Exposition Manager
7. 1938
Date Exposition Established
8. Annual
Frequency of Event
9. Philadelphia, P.A.
Location of Next Exposition
10. April 29-May 3, 1968
Date of Next Exposition
11. AUDIENCES OR MARKETS SERVED

The ASTME Tool Exposition serves corporate management, manufacturing management, tool and manufacturing engineers, production specialists, and technicians whose responsibilities require continuing knowledge of the tools and equipment used in metalworking. Most of these men have the authority to select or recommend the equipment needed in their plants.

12. DEFINITION OF EXPOSITION OBJECTIVES

To advance manufacturing technology by providing a forum for the demonstration of machine tools, accessories, and other production equipment used in the processing, testing, inspection, fabricating, finishing, and assembly of manufactured products. Each tool exposition is complemented by an engineering conference focusing on new developments and practices in tool and manufacturing engineering.

13. PAST FIVE CONSECUTIVE EXPOSITION REGISTRATIONS

Years in Which Expositions Occurred	PAID REGISTRATION			NON-PAID REGISTRATION			TOTAL
	Exhibitor Personnel	Registrants	Total Paid Registration	Exhibitor Personnel	Registrants	Total Non-Paid Registration	Paid and Non-Paid Combined
1967	--	15,608	15,608	7,180	20,490	27,670	43,278*
1966	--	13,345	13,345	5,313	24,558	29,871	43,216
1965	--	11,219	11,219	4,844	18,413	23,257	34,476
1964	--	16,105	16,105	5,002	21,210	26,212	42,317
1963	--	15,855	15,855	4,831	20,001	24,832	40,687

* Does not include 1,711 student registrations.

NOTE: Registration figures for 1963 through 1966 are reported as exposition management's sworn statement and are included for comparative purposes.

Appendix 22 (continued)

14. ASME TOOL EXPOSITION REGISTRATION BY INDUSTRY AND OCCUPATION, 1967

SIC	INDUSTRY	CLASSIFICATION BY FUNCTION														Not Classified
		Per- cent of Total	Corporate Management	Manufacturing Management	Assembly	Casting, Molding & Metallurgical Processing	Engineering Materials	Finishing & Coating	Inspection & Quality Control	Manufacturing Systems	Material Handling	Material Removal	Research & Development	Design	Sales	
19	Ordinance & Accessories	2,070 5.0	428	663	64	61	42	19	46	342	37	64	64	83	50	127
25	Furniture & Fixture	571 1.0	38	214	24	22	20	16	23	23	25	23	21	85	18	19
28	Chemicals & Allied Products	653 1.0	61	24	17	21	24	25	21	18	22	16	85	19	171	129
33	Primary Metal Industries	2,144 5.0	537	686	41	127	144	21	17	209	63	85	43	144	124	103
34	Fabricated Metal Products	11,820 28.0	1796	3553	452	301	413	64	448	1253	473	451	606	724	582	618
35	Machinery (Except Electrical)	7,112 16.0	936	2204	140	208	79	56	206	764	119	133	313	722	835	347
36	Electrical Machinery	2,625 6.0	232	706	196	61	90	20	148	393	81	57	168	313	125	104
37	Transportation Equipment	1,670 4.0	68	449	143	19	45	41	64	427	64	65	145	89	22	24
38	Scientific Instruments	1,421 3.0	215	496	19	22	23	23	190	151	19	25	150	85	65	63
	Miscellaneous Manufacturing	8,461 20.0	1,192	2,461	307	351	203	55	157	974	333	463	477	677	461	290
	Engineering Services	2,463 6.0	491	274	17	83	21	20	82	232	59	212	126	425	317	104
	Other: Colleges, Government Agen- cies, Student etc	2,198 5.0	343	233	41	13	51	18	16	80	20	55	341	58	336	593
	Total	43,278 100.0	6157	11899	1393	1,509	1,160	373	1418	4,952	1,315	1,719	2,559	3,429	3096	2,521

Source: ASME Exposition Registration Report for 1967.

15. GEOGRAPHICAL ANALYSIS OF REGISTRATION

STATE	Number	%	STATE	Number	%
Maine ..	19		Kentucky ..	218	
New Hampshire	27		Tennessee ..	140	
Vermont ..	109		Alabama ..	86	
Massachusetts	795		Mississippi..	58	
Rhode Island	48		EAST SO.		
Connecticut	317		CENTRAL ..	502	1.0
NEW			Arkansas ..	54	
ENGLAND ..	1,815	4.0	Lousiana ..	17	
New York ..	1,569		Oklahoma ..	51	
New Jersey ..	605		Texas ..	152	
Pennsylvania	1,053				
MIDDLE			WEST SO.		
ATLANTIC ..	3,227	7.0	CENTRAL ..	274	0.60
Ohio ..	2,216		Montana ..	--	
Indiana ..	2,947		Idaho ..	6	
Illinois ..	19,044		Wyoming ..	2	
Michigan ..	4,256		Colorado ..	111	
Wisconsin ..	4,861		New Mexico ..	9	
EAST NO.			Arizona ..	22	
CENTRAL ..	33,324	77.0	Utah ..	18	
Minnesota ..	671		Nevada ..	--	
Iowa ..	607		MOUNTAIN	168	0.40
Missouri ..	516		Alaska ..	--	
North Dakota	6		Washington ..	54	
South Dakota	4		Oregon ..	25	
Nebraska ..	69		California ..	347	
Kansas ..	129		Hawaii ..	--	
WEST NO.					
CEN RAL ..	2,002	5.0	PACIFIC ..	426	1.0

Appendix 22 (continued)

STATE	Number	%	STATE	Number	%
Delaware ..	19		UNITED STATES	42,480	98.0
Maryland ..	217		U.S. Territories	--	
District of Columbia	17		Canada ..	306	
Virginia ..	108		Foreign ..	385	
West Virginia	41		Unclassified	107	
North Carolina	149				2.0
South Carolina	6				
Georgia ..	123				
Florida ..	62				
SOUTH ATLANTIC	742	2.0	REGISTRATION	43,276	100.0

16. EXHIBIT SPACE AND EXHIBITORS (FIVE CONSECUTIVE EXPOSITIONS)

Year	Show Location (City & Exhibit Hall)	Square Feet of Net Exhibit Space Sold	Total Number of Contract Exhibitors
1967	Chicago, Illinois - International Amphitheatre	226,000	672
1966	Detroit, Michigan - Cobo Hall	161,165	580
1965	Cleveland, Ohio - Public Auditorium	129,588	490
1964	Detroit, Michigan - Cobo Hall	152,000	517
1963	Chicago, Illinois - International Amphitheatre	135,860	470

17. IS EXPOSITION OPEN TO THE GENERAL PUBLIC? YES ☐ NO ☐

Appendix 22 (continued)

18. IS DIRECTORY OF EXPOSITION REGISTRANTS PUBLISHED? YES ☐
NO ☐

☐ SELECTED LIST ☐ TOTAL LIST WHEN _____

19. IS A CONFERENCE HELD IN CONJUNCTION WITH EXPOSITION YES ☐

NO ☐

20. IF SO, IS THERE A SEPARATE REGISTRATION FOR THE CONFERENCE?

YES ☐ NO ☐

21. REGISTRATION FEE SCHEDULE FOR BOTH EXPOSITION AND CONFERENCE

\$ 1.00 for ASTM members

\$ 2.00 for non-members

Exhibitors also distribute complimentary guest invitations supplied by ASTM.

22. STATEMENT BY AUDITOR OR ORGANIZATION ISSUING REPORT

In our opinion, the statistical information concerning registrations and attendance at the ASTM Tool Exposition held in Chicago, Illinois, on April 24-28, 1967, which appears in this report under items 13, 14, and 15, presents fairly the information shown therein which pertains to the year 1967. Our examination of this information was made in accordance with generally accepted auditing standards, and accordingly included such tests of the registration forms and accounting records and such other auditing procedures as we considered necessary in the circumstances.

Ernst & Ernst

Detroit, Michigan

June 22, 1967

Export of Machine Tools from the U.S. by Type and Country
of Destination, 1965-1967

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Horizontal Boring-Drilling Milling (7151002)									
Canada	64	2211896	34561	88	2159902	24544	39	1731282	44392
Mexico	15	80613	5374	8	46219	5777	13	329944	25380
Guatmal	1	12041	12041	-	-	-	-	-	-
Colombia	4	77500	19375	-	-	-	-	-	-
Peru	1	914018	91408	-	-	-	-	-	-
Chil	3	39488	13162	6	164681	27447	-	-	-
Brazil	2	22200	11100	6	179469	29911	-	-	-
Argentina	5	204953	40991	-	-	-	2	102615	51308
Sweden	9	1235609	137289	6	1256196	209366	-	-	-
U.K.	11	876780	79707	12	1540201	128350	-	-	-
							14	2130210	152158
Netherland	6	177988	29664	3	100743	33581	3	100739	33580
Belgium	3	328764	109588	-	-	-	4	17277	4319
France	5	182087	36417	4	531276	132319	4	1053009	263252
West Germany	13	203788	15676	10	467062	46706	7	131867	18838
Switzerland	6	140031	23339	1	331958	331958	2	143975	71988
Spain	1	32000	32000	-	-	-	-	-	-
Italy	1	89734	89734	1	24660	24660	8	837798	104725
Turkey	3	501080	167026	-	-	-	-	-	-
Iran	1	14835	14835	-	-	-	-	-	-
S. Arab	2	28312	14156	-	-	-	-	-	-
India	4	516771	129193	4	304472	76118	15	836440	55763
Pakistan	6	111581	18596	4	32715	8179	1	11210	11210
Japan	3	111750	37250	6	222769	37128	6	259241	43207

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Australia	3	93082	31027	2	245552	122776	3	26167	8722
Finland	-	-	-	1	131085	131085	1	249078	249078
Denmark	-	-	-	1	20000	20000	-	-	-
Rep. SAF.	-	-	-	2	16969	8485	-	-	-
Other city	11	25536	2322	17	39782	2340	9	23225	60947
Total	183	7409827	40491	182	7815711	42943	131	7984077	60947
Vertical Boring and Turning Mills									
Incl. Vertical Turret Lathe (7151004)									
Canada	50	759495	15189	32	968068	30252	60	1424009	23733
Mexico	14	234087	16727	21	63641	3030	14	189224	13516
Sweden	1	257995	257995	-	-	-	1	211765	211765
U.K.	7	223625	31946	3	118058	39353	7	222307	31758
Belgium	2	38646	14323	-	-	-	-	-	-
West Germany	1	33000	33000	1	45240	45240	3	95902	31967
Spain	2	17450	8725	1	51947	51947	-	-	-
India	15	371756	24783	9	597118	66346	3	132614	44205
Pakistan	3	18878	6293	-	-	-	-	-	-
Japan	2	51260	25630	3	198266	66089	-	-	-
Australia	3	92476	30825	1	26862	26862	2	63455	31728
Nigeria	1	77000	77000	-	-	-	-	-	-
Rep. SAF	3	133793	44598	-	-	-	-	-	-
Venezuela	-	-	-	22	29736	1352	-	-	-
Ecuador	-	-	-	1	12600	12600	-	-	-
Finland	-	-	-	1	78605	78605	-	-	-
France	-	-	-	5	40578	8116	-	-	-
Switzerland	-	-	-	2	205551	102776	-	-	-
Kor. Rep.	-	-	-	7	109428	15632	-	-	-
Egypt	-	-	-	1	38490	38490	-	-	-
Colombia	-	-	-	-	-	-	-	-	-
Other city	22	34894	1586	20	27503	1375	3	14150	4717
Total	126	2334355	18527	130	2611691	20090	23	25939	1128
							116	2374315	20612

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Precision Jig and Boring Machines NEG (7151006)									
Canada	11	91965	8360	59	374235	6342	23	158933	6910
Mexico	42	739285	17602	13	126116	9701	3	68407	22802
U.K.	240	269194	1122	32	279306	8728	2	156000	78000
France	6	150147	25025	7	279515	39930	22	432157	19644
Switzerland	1	22336	22336	-	-	-	-	-	-
Spain	10	152753	15275	5	73699	14740	-	-	-
Italy	4	95865	23966	5	67693	13539	7	211875	30268
India	21	208965	9951	5	72826	14563	9	277592	30844
Pakistan	2	44856	22428	-	-	-	-	-	-
Japan	9	143430	15937	5	69931	13986	1	25800	25800
Australia	86	121463	14120	-	-	-	1	26409	26409
New Zealand	4	17249	4312	-	-	-	-	-	-
Egypt	1	18978	18978	-	-	-	-	-	-
Rep. SAF	3	137029	45670	-	-	-	1	47809	47809
Brazil	-	-	-	-	-	-	13	118716	9132
Finland	-	-	-	3	210068	70023	1	144474	144474
West Germany	-	-	-	-	-	-	2	91433	45717
Israel	-	-	-	-	-	-	14	26682	1906
Tunisia	-	-	-	-	-	-	4	13739	3435
Denmark	-	-	-	1	15000	15000	-	-	-
Belgium	-	-	-	1	34616	34616	-	-	-
Turkey	-	-	-	3	16915	5638	-	-	-
Taiwan	-	-	-	1	13000	13000	-	-	-
Kor. Rep.	-	-	-	1	15629	15629	-	-	-
Other city	27	32504	1204	31	51152	1650	25	32398	1296
Total	467	2246019	4810	172	1699701	9882	128	1832424	14316

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Drilling Machines Vertical NES (7151008)									
Canada	433	712974	1476	1101	757408	688	844	827765	981
Mexico	144	237904	1652	179	255482	1427	300	265112	884
Venezuela	84	27575	328	-	-	-	-	-	-
Chile	586	103840	177	22	36671	1667	-	-	-
Sweden	27	181368	6717	30	51314	1711	28	22098	789
Norway	2	29179	14589	15	25615	1706	-	-	-
Finland	4	32870	8218	67	89198	1331	-	-	-
U.K.	1304	661404	507	394	493821	1254	1	148210	148210
Netherlands	14	20932	1495	85	47104	554	449	396823	884
France	1176	303179	258	289	354560	1227	50	35932	719
							56	144802	2586
West Germany	722	190189	263	-	-	-	114	92799	814
Switzerland	39	32172	825	-	-	-	7	11207	1601
Spain	6	30065	5011	-	-	-	-	-	-
Italy	224	42404	189	-	-	-	48	180524	3761
Turkey	70	25988	371	-	-	-	-	-	-
Japan	10	208777	20878	31	58486	1887	17	209253	12310
Australia	1247	376008	302	117	127182	1087	70	372133	5316
New Zealand	169	39212	232	57	36059	633	-	-	-
Rep. S.A.F.	295	331027	1122	-	-	-	109	33162	304
Denmark	-	-	-	13	30290	2330	-	-	-
Ireland	-	-	-	11	16133	1467	-	-	-
Belgium	-	-	-	31	29720	959	-	-	-
Iran	-	-	-	15	13583	906	-	-	-
India	-	-	-	91	95556	1050	190	881015	4637
Pakistan	-	-	-	61	47698	782	-	-	-
Ghana	-	-	-	8	17607	2201	-	-	-
Brazil	-	-	-	-	-	-	26	123853	4764
Tunisia	-	-	-	-	-	-	19	26001	1368
Other city	267	91374	342	252	122208	485	243	131598	543
Total	6873	3678441	535	2932	2745027	935	2571	3902297	1918

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Drilling Machines, Multi Spindle (751010)									
Chile	-	-	-	-	-	-	1	43000	43000
Canada	31	323126	10423	21	225617	10744	53	398611	7521
Mexico	16	327597	20475	8	78612	9825	8	118139	14767
Venezuela	1	44500	44500	-	-	-	-	-	-
Sweden	1	14373	14373	1	62100	62100	2	95739	47870
U.K.	6	15265	2544	12	51312	4276	13	151849	11681
India	6	53303	8834	4	129040	32260	4	153253	38313
Rep. SAF	15	785497	52366	-	-	-	6	154009	19251
France	-	-	-	7	122650	17521	5	448650	89730
West Germany	-	-	-	7	26270	3753	7	122499	17500
Japan	-	-	-	1	79440	79440	-	-	-
Netherlands	-	-	-	-	-	-	2	21600	10800
Italy	-	-	-	-	-	-	4	155252	38813
Australia	-	-	-	-	-	-	2	148806	74403
Other city	21	59791	2847	10	34007	3401	10	18974	1897
Total	97	1623457	16736	71	809048	11395	119	2030381	17062
Drilling Machines, Radial (7151012)									
Canada	13	109103	8393	5	47967	9593	12	235334	19611
Mexico	12	99909	8326	6	63416	10569	7	64456	9208
Colombia	1	13500	13500	2	28010	14005	1	13585	13585
Chile	4	34680	8670	1	12704	12704	2	38420	19210
France	1	18001	18001	-	-	-	-	-	-
Australia	1	21334	21334	-	-	-	1	30500	30500

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Rep. SAF	8	90538	11317	-	-	-	-	-	-
Jamaica	-	-	-	1	25339	25339	-	-	-
Denmark	-	-	-	1	28504	28504	-	-	-
Italy	-	-	-	2	31365	15682	-	-	-
Pakistan	-	-	-	3	17908	5969	-	-	-
Phil. Rep.	-	-	-	2	42022	21011	-	-	-
Portugal	-	-	-	-	-	-	4	48679	12170
Iran	-	-	-	-	-	-	1	11850	11850
S. Arab	-	-	-	-	-	-	1	16011	16011
India	-	-	-	-	-	-	1	12863	12863
Kor. Rep.	-	-	-	-	-	-	1	22900	22900
Japan	-	-	-	-	-	-	5	38314	7663
Other city	12	26903	2242	10	25710	2571	5	22335	4467
Total	52	413968	7961	33	322945	9786	41	555247	13543
Drilling Machines, NEC (7151014)									
Canada	55	413612	6363	98	474593	4843	60	447449	7457
Mexico	43	190038	4419	23	297181	12921	34	584840	17201
Trinidad	1	42377	42377	-	-	-	-	-	-
Venezuela	5	53318	10664	-	-	-	56	67578	1207
Chile	7	17112	2445	5	60315	12063	-	-	-
Argentina	4	79834	19959	-	-	-	-	-	-
Sweden	2	54162	27081	-	-	-	-	-	-
U.K.	24	387668	11402	31	151490	4887	91	627974	6901
Netherlands	3	28013	9338	-	-	-	-	-	-
France	18	342670	19037	19	756600	39821	14	618342	44167

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
West Germany	5	102653	20531	11	66171	6015	7	168480	24069
Italy	7	173205	24744	-	-	-	13	84095	6469
India	5	109155	21831	-	-	-	16	348024	21752
Pakistan	3	53398	17799	28	75611	2700	-	-	-
Australia	5	52729	10546	4	64358	16089	2	49301	24651
Rep. SAF	18	673608	37422	-	-	-	1	18481	18481
Salvador	-	-	-	1	44216	44216	-	-	-
Denmark	-	-	-	1	29318	29318	-	-	-
Belgium	-	-	-	1	14887	14887	-	-	-
Austria	-	-	-	1	19170	19170	1	28425	28425
Switzerland	-	-	-	5	22337	4467	-	-	-
Turkey	-	-	-	7	48907	6987	7	18640	2663
S. Arab	-	-	-	8	18510	2314	-	-	-
Thailand	-	-	-	3	13274	4425	-	-	-
Egypt	-	-	-	3	35186	11729	-	-	-
Ghana	-	-	-	5	21355	4271	-	-	-
Japan	-	-	-	-	-	-	9	189402	21045
Brazil	-	-	-	-	-	-	2	24727	12364
Finland	-	-	-	-	-	-	5	76453	15291
USSR	-	-	-	-	-	-	2	49210	24605
S. Vietnam	-	-	-	-	-	-	16	29679	1855
Taiwan	-	-	-	-	-	-	1	73931	73931
New Zealand	-	-	-	-	-	-	1	58360	58360
Other city	68	92912	1366	135	81363	6027	60	87686	1461
Total	293	2866464	9783	389	2294842	5899	398	3651077	9174

Gear Hobbors (7151016)

Canada	14	72643	5189	8	288659	36082	1	62000	62000
Mexico	3	43207	14402	3	54213	18071	2	38833	19417
U.K.	6	141626	23604	7	549196	78457	9	405949	45105

Appendix 23 (Cont'd)

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Netherlands	8	392571	49071	-	-	-	-	-	-
France	3	89246	29748	2	66103	33052	-	-	-
West Germany	1	27976	27976	2	158564	79282	-	-	-
Switzerland	1	22694	22694	-	-	-	-	-	-
Spain	4	160710	40177	-	-	-	-	-	-
Italy	3	128639	42879	-	-	-	2	76230	38115
India	8	175643	21955	14	325266	23233	8	115118	14390
Japan	4	110116	27529	-	-	-	-	-	-
Australia	1	35306	35306	-	-	-	-	-	-
Egypt	1	55975	55975	-	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	-
Phil. Rep.	-	-	-	1	13000	13000	-	-	-
Colombia	-	-	-	1	15770	15770	-	-	-
Brazil	-	-	-	-	-	-	-	-	-
Argentina	-	-	-	-	-	-	1	31616	31616
Other city	15	7403	493	-	-	-	2	20001	10001
Total	72	1463755	20329	2	10431	5216	2	58008	29004
				40	1481202	37030	-	-	-
							27	807755	29917
Gear Tooth Grinding and Finishing Machines (7151018)									
Canada	74	1205522	16290	38	492772	12968	56	1511179	26985
Mexico	12	105243	8770	8	16337	2042	10	31933	3193
Brazil	5	100052	20010	-	-	-	12	406053	33838
Argentina	2	73044	36522	3	107087	35696	5	152317	30463
Sweden	12	47197	3933	82	227463	2774	9	230558	25618
U.K.	89	1411208	15856	76	2079018	27356	171	2003696	11718
Ireland	1	16920	16920	-	-	-	4	22705	5676
Netherlands	20	784877	39244	1	72061	72061	-	-	-
France	6	177024	29504	19	591886	31152	24	760438	31685
West Germany	32	1272586	39768	32	1184645	37020	56	1248099	22337

Type (SITC)
Country of
Destination

	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Switzerland	2	88566	44283	-	-	-	-	-	-
Spain	18	503878	27993	11	517820	47075	17	697347	41020
Italy	33	696556	21108	13	385405	29647	26	1353635	52063
Turkey	6	60265	10044	-	-	-	-	-	-
India	35	202823	5795	19	479803	25253	2	150740	75370
Japan	71	2609696	36757	58	1821068	31398	117	4012298	34293
Australia	12	270469	22539	4	136430	34107	9	182553	35700
Egypt	1	113629	113629	-	-	-	4	142801	41051
Chile	-	-	-	4	78276	19569	-	-	-
Denmark	-	-	-	14	536999	38537	-	-	-
Austria	-	-	-	1	52655	52655	1	42430	42430
Poland	-	-	-	3	186087	62029	-	-	-
Yugoslavia	-	-	-	3	126473	42158	1	33097	33097
Kor. Rep.	-	-	-	2	95804	47902	1	208843	208843
Rep. S.A.F.	-	-	-	4	68540	17135	10	410507	41051
Nicaragua	-	-	-	-	-	-	2	12746	6373
Colombia	-	-	-	-	-	-	2	12627	6314
USSR	-	-	-	-	-	-	9	487194	54133
Burma	-	-	-	-	-	-	2	79030	39515
Other city	12	21994	1833	16	28572	1786	22	33636	1529
Total	443	9761549	22040	411	9285201	22592	572	14226462	24871

Appendix 23 (Cont'd)

Gear Cutting Machines (7151020)

Canada	38	600658	15807	12	160092	13341	26	482594	18561
Mexico	5	38043	7609	9	287304	31923	5	120328	24066
Brazil	3	118399	39467	1	69121	69121	5	119791	23958
Argentina	1	46605	46605	13	211207	16247	1	54944	54944
U.K.	13	191411	14724	27	800067	29632	8	157022	19628
Netherlands	10	539077	53908	1	81000	81000	-	-	-
France	3	64231	21410	9	313532	34837	9	323886	35987

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
West Germany	9	319073	35452	9	347705	38634	5	168252	33650
Poland	2	84685	42343	1	61250	61250	-	-	-
Spain	7	276122	39446	2	44294	22147	8	342669	42834
Italy	11	290736	26431	5	151079	30216	20	724805	36240
Yugoslavia	1	17035	17035	1	41072	41072	-	-	-
India	4	53698	13425	14	420534	30038	7	227719	31531
Japan	49	1891253	38597	30	991284	33042	33	1133440	33347
Australia	5	227627	45525	2	69343	34672	2	66206	33103
Jamaica	-	-	-	3	25278	8426	-	-	-
Sweden	-	-	-	18	696909	38717	6	156007	26001
Denmark	-	-	-	3	137007	45669	-	-	-
Belgium	-	-	-	2	13939	6970	-	-	-
Switzerland	-	-	-	2	28075	14038	-	-	-
Pakistan	-	-	-	2	16431	8216	-	-	-
USSR	-	-	-	-	-	-	29	1047337	36115
Rep. SAF	-	-	-	-	-	-	3	140261	46754
Other city	5	14039	2808	15	36271	2418	14	19341	1382
Total	166	4772692	28760	181	5002794	27640	181	5284602	29197
Grinding Machines External									
Cylindrical (7151022)									
Canada	198	4226602	21346	86	4921523	57227	46	1334178	29004
Mexico	33	299350	9071	29	280952	9688	25	288107	11524
Chile	2	18904	9452	-	-	-	4	53559	13390
Brazil	1	25663	21663	-	-	-	11	535702	48700
Sweden	1	15305	15305	3	59900	19967	-	-	-
U.K.	34	227574	6693	31	633504	20436	22	646853	29402
Netherlands	30	793087	26436	27	424162	15710	22	223313	10151
Belgium	4	80511	20128	10	409358	40936	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
France	17	789477	46489	29	1283714	44266	25	3033665	41347
West Germany	26	1511747	58144	10	992109	99211	26	970275	37318
Spain	15	766359	51091	1	113887	113887	6	373974	62329
Italy	10	780665	78066	33	2343676	71021	12	545437	45453
Yugoslavia	1	58177	58177	2	224996	112498	-	-	-
Greece	1	24000	24000	-	-	-	-	-	-
Turkey	9	144395	16043	23	111755	4859	1	21175	21175
Iran	1	17888	17888	-	-	-	-	-	-
Afghanistan	1	13738	13738	-	-	-	-	-	-
India	29	508135	17522	48	1077243	22442	50	1553580	31072
Pakistan	3	25807	8602	-	-	-	-	-	-
Japan	28	1667835	59565	18	545995	30333	24	950595	39608
Australia	9	183192	20354	4	159595	39999	2	101693	50847
Egypt	1	18758	18758	2	69245	34623	-	-	-
Cnry. Island	1	15430	15430	-	-	-	-	-	-
Kenya	1	14382	14382	-	-	-	-	-	-
Rep. SAF	2	38262	19131	1	14423	14423	-	-	-
Panama	-	-	-	1	12074	12074	-	-	-
Venezuela	-	-	-	1	17594	17594	17	44399	2641
Argentina	-	-	-	5	66162	13232	7	251195	35885
Austria	-	-	-	2	169114	84557	1	13513	13513
Switzerland	-	-	-	4	18530	4633	2	40327	20164
USSR	-	-	-	-	22820	-	8	937243	117155
Israel	-	-	-	2	13294	9147	5	14512	2902
Kor. Rep.	-	-	-	1	12313	12313	1	14740	14740
Taiwan	-	-	-	4	20890	5223	3	52578	17526
Sudan	-	-	-	1	16747	16747	-	-	-
Honduras	-	-	-	-	-	-	1	14835	14835
Nicaragua	-	-	-	-	-	-	1	14756	14756
Bolivia	-	-	-	-	-	-	1	14903	14903

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Finland	-	-	-	-	-	-	2	116220	58110
Rumania	-	-	-	-	-	-	3	30225	10075
Other city	20	23321	1166	24	69889	2912	8	31173	3897
Total	478	12288564	25708	402	14110464	35101	336	10223225	30426
Surface Grinding Machines (7151024)									
Canada	154	1734503	11263	182	1254868	6895	140	692643	4947
Mexico	79	312501	3956	52	159975	3076	37	152587	4124
Guatemala	2	12677	6339	-	-	-	-	-	-
Brazil	5	40400	8080	7	61946	8849	25	140340	5614
Sweden	12	203191	16933	4	35931	8983	24	64993	2708
U.K.	50	401385	8028	24	299003	12459	44	360506	8193
Netherlands	3	24820	8273	8	92041	11505	-	-	-
Belgium	17	286654	16862	-	-	-	7	100837	14405
France	21	275664	13127	31	317564	10244	67	562112	8390
West Germany	20	264702	13235	12	310539	25878	11	70876	6443
Switzerland	5	73873	14775	18	70988	3944	76	78872	1038
Spain	5	61567	12313	5	122808	24562	10	168455	16846
Portugal	1	45003	45003	-	-	-	-	-	-
Italy	5	76303	15261	-	-	-	7	127984	18283
Turkey	7	44772	6396	172	43515	253	5	12410	2482
Israel	13	16468	1266	-	-	-	2	11993	5997
India	80	266200	3328	20	224237	11212	27	1004828	37216
Japan	21	769224	36629	12	274937	22911	17	371863	21874
Australia	20	399940	19997	-	-	-	3	117141	39047
Rep. S.A.F.	4	66424	16606	4	20549	5137	-	-	-
Colombia	-	-	-	6	24756	4126	-	-	-
Chile	-	-	-	7	25474	3639	4	33526	8382
Austria	-	-	-	2	24455	12228	2	46288	23144

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Pakistan	-	-	-	6	27606	4601	-	-	-
Phil. Rep.	-	-	-	7	16983	2426	-	-	-
Hong Kong	-	-	-	17	17897	1053	10	11745	1175
Taiwan	-	-	-	1	12747	12747	2	38321	19161
Egypt	-	-	-	3	24203	8068	-	-	-
Ghana	-	-	-	6	18156	3026	-	-	-
Honduras	-	-	-	-	-	-	3	11021	3674
Dom. Rep.	-	-	-	-	-	-	6	16741	2790
Venezuela	-	-	-	-	-	-	12	13239	1103
Peru	-	-	-	-	-	-	3	16011	5337
Argentina	-	-	-	-	-	-	3	171411	57137
Finland	-	-	-	-	-	-	1	77463	77463
Ireland	-	-	-	-	-	-	4	19490	4873
Kor. Rep.	-	-	-	1	-	-	4	52151	13038
Other city	61	104498	1633	61	89554	1468	62	71853	1159
Total	588	5480769	9321	557	3570732	53534	618	4617700	7472

Tool and Cutter Grinding Machines (7151026)

							Appendix 23 (Cont'd)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Canada	331	900015	2719	319	939406	2945	260	593184	2281
Mexico	100	277384	2773	80	272579	3408	82	83583	1019
Colombia	4	12176	3044	20	32565	1628	-	-	-
Venezuela	33	21531	655	19	25316	1332	-	-	-
Chile	10	16110	1611	29	88453	3050	5	12763	2553
Brazil	9	17315	1924	16	81807	5113	18	98376	5465
Argentina	7	39005	5572	15	28943	1930	5	66916	13383
Sweden	8	97811	12266	10	63588	6359	72	223945	3110
Finland	3	18097	6032	16	16191	1012	-	-	-
U.K.	189	593291	3139	98	472194	4819	90	256538	2850

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Ireland	12	39645	3304	-	-	-	3	14316	4772
Netherlands	25	128739	5149	26	76804	2954	8	13468	1684
France	26	299662	11525	21	130919	6234	16	103073	6442
West Germany	72	333055	4626	106	313904	2961	59	685205	11614
Austria	7	98976	14139	-	-	-	-	-	-
Switzerland	8	25642	3205	-	-	-	2	14900	7450
Spain	2	53792	26896	-	-	-	1	35271	35271
Portugal	3	19700	6567	2	16029	8014	-	-	-
Italy	6	59458	9909	5	23862	4772	18	100535	5585
Turkey	7	36532	5219	11	46959	4269	13	67136	5164
Bahrain	4	14132	3533	-	-	-	-	-	-
Indian	168	306968	1827	52	465222	8947	15	157803	10489
Taiwan	5	14456	2891	4	37437	9359	-	-	-
Japan	62	769201	12406	81	434461	5364	37	405357	10956
Australia	14	122268	8733	17	159730	9984	9	46495	5166
Rep. SAF	9	59504	6612	19	23237	1381	11	53346	4850
Salvador	-	-	-	3	17252	5751	-	-	-
Denmark	-	-	-	2	36872	18463	3	25970	8657
Belgium	-	-	-	10	18807	1881	15	106100	7073
Pakistan	-	-	-	16	22447	1403	-	-	-
S. Vietnam	-	-	-	4	18349	4587	-	-	-
Peru	-	-	-	-	-	-	9	20579	2287
USSR	-	-	-	-	-	-	27	13548	502
Burma	-	-	-	-	-	-	2	22887	11444
Phil. Rep.	-	-	-	-	-	-	10	43425	4343
New Zealand	-	-	-	-	-	-	3	26488	8829
Egypt	-	-	-	-	-	-	3	18246	6082
Other city	103	120276	1168	184	137244	746	160	125543	785
Total	1227	4494841	3663	1185	4013677	3387	957	3441996	3000

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Polishing and Buffing Machines (7151028)									
Canada	324	389522	1202	371	608448	1640	173	370812	2143
Mexico	115	127307	1107	43	132508	3081	41	46869	1143
Guatemala	1	29411	29411	13	22795	1753	-	-	-
Colombo	11	19938	1813	-	-	-	-	-	-
U.K.	12	153185	12765	15	70876	4725	6	65136	10856
Belgium	5	17455	3491	20	47176	2359	-	-	-
West Germany	37	217900	5889	50	231970	4639	-	-	-
Switzerland	143	68459	479	-	-	-	193	58535	304
India	34	17529	516	-	-	-	9	35581	4065
Japan	105	45609	434	-	-	-	49	20333	415
Australia	5	22508	4502	4	29934	7483	-	-	-
Netherlands	-	-	-	4	45996	11499	-	-	-
France	-	-	-	31	34116	1100	7	24263	3466
Pakistan	-	-	-	21	14124	673	-	-	-
Sweden	-	-	-	-	-	-	145	66728	460
Taiwan	-	-	-	-	-	-	14	41697	2978
Other city	150	82225	548	188	91265	485	128	76090	594
Total	942	1191048	1264	760	1329207	1749	765	807144	1055
Honing and Lapping Machine (7151030)									
Canada	140	913348	6524	416	1275039	3065	112	477729	4265
Mexico	112	331094	2956	89	158009	1775	82	123388	1505
Chile	8	19771	2471	-	-	-	18	27727	1540
Brazil	2	23413	11706	21	69096	3290	14	48244	3446
Sweden	57	47032	825	30	41518	1384	44	45549	1035

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Finland	53	49603	936	84	41305	492	53	25439	480
Denmark	49	44597	912	27	24720	915	42	37238	887
U.K.	57	267903	4700	66	459074	7107	173	452283	2614
Ireland	2	19600	9800	-	-	-	-	-	-
Netherlands	70	82499	1179	31	29881	964	33	17128	519
France	23	44933	1954	50	192091	3842	47	154840	3294
West Germany	99	215448	2176	106	114180	1077	54	60815	1126
Austria	30	14478	480	22	17378	790	38	24153	636
Switzerland	31	13861	447	18	25333	1407	30	55241	1841
Spain	57	187270	3285	37	51139	1382	50	96991	1940
Italy	78	362323	4645	127	202181	1592	103	221521	2151
Turkey	31	60525	1952	51	41443	813	33	58830	1783
India	140	270499	1932	80	393418	4918	57	453239	7952
Pakistan	17	12250	721	-	-	-	-	-	-
Vietnam	1	27023	27023	-	-	-	-	-	-
Taiwan	4	23257	5814	-	-	-	14	22814	1530
Japan	27	468355	17347	69	410944	5956	45	499418	11098
Australia	19	119530	6291	28	64997	2321	24	61385	2558
Egypt	4	12598	3149	1	30161	30161	-	-	-
Ref. SAF	15	37994	2533	-	-	-	17	12366	727
Other city	140	152529	1090	154	137322	892	127	119284	939
Colombia	-	-	-	11	17079	1553	-	-	-
Uruguay	-	-	-	7	47287	6755	-	-	-
Belgium	-	-	-	10	12060	1206	17	132161	7774
Iran	-	-	-	19	28723	1512	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Phil. Rep.	-	-	-	21	15533	740	-	-	-
Venezuela	-	-	-	-	-	-	11	22850	2077
Peru	-	-	-	-	-	-	17	14322	842
USSR	-	-	-	-	-	-	18	220230	12268
Kor. Rep.	-	-	-	-	-	-	3	27237	9079
Total	1266	3821943	3019	1575	3909909	2482	1276	3513022	2753
Grinding Machines, Internal Cylindrical (7151032)									
Canada	17	473211	27835	15	635922	42395	13	374414	28801
Mexico	6	68015	11336	3	17199	5733	-	-	-
Argentina	1	42423	42423	-	-	-	2	91716	45858
U.K.	20	832252	41612	11	275747	25067	13	472822	36371
Netherlands	2	37391	18695	-	-	-	-	-	-
France	18	560555	31144	5	195403	39080	6	215259	35877
West Germany	9	288758	32084	2	59287	29643	1	38443	38443
Switzerland	2	52376	26188	1	21128	21128	3	72555	24185
Turkey	2	53310	26655	-	-	-	-	-	-
India	6	203524	33921	6	203706	33951	10	529026	52903
Japan	23	838215	36444	4	270368	54073	20	894244	44712
Australia	2	46121	23061	-	-	-	2	120950	60475
Rep. SAF	1	19940	19940	-	-	-	-	-	-
Brazil	-	-	-	5	32048	6410	1	49506	49506
Austria	-	-	-	1	47880	47880	-	-	-
Spain	-	-	-	1	49184	49184	2	80924	40462
Italy	-	-	-	2	88877	44439	4	93344	23336
Other city	3	6030	2010	4	18573	4643	2	10633	5317
Total	112	3522154	31447	61	1915322	31399	79	3043836	38530

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Grinding and Polishing Machines (7151034)									
Canada	965	1911076	1980	736	2360602	3207	904	1078634	1193
Mexico	455	440537	968	155	171765	1108	221	133276	603
Guatmal	30	107539	3585	12	12936	1078	-	-	-
Venezuela	185	37694	204	69	50160	726	37	33815	914
Peru	108	18079	167	51	27330	536	63	21835	347
Chile	21	98456	4688	23	16264	707	-	-	-
Brazil	7	15801	2257	10	25826	2582	24	63961	2665
Sweden	14	91067	6505	19	37183	1957	-	-	-
U.K.	241	199478	828	102	466603	4574	110	598551	5441
Ireland	14	78855	5633	9	48177	5353	-	-	-
Belgium	99	24405	247	42	32034	763	-	-	-
France	52	574127	11041	54	325186	6022	20	177094	8855
West Germany	326	428435	1314	95	340942	3589	79	159450	2018
Austria	4	30354	7588	-	-	-	5	33896	6779
Switzerland	16	76305	4769	94	180670	1922	87	92306	1061
Spain	15	440127	29341	-	-	-	-	-	-
Italy	29	412885	14237	105	628903	5990	42	266385	6343
Turkey	38	17057	449	-	-	-	30	76039	2535
Israel	20	127487	6374	17	32707	1924	-	-	-
India	134	189133	1411	57	127249	2233	132	163767	1241
Pakistan	151	54370	360	-	-	-	-	-	-
Phil. Rep.	36	12902	358	24	28846	1202	4	11110	2778
Japan	54	505455	9360	52	147293	2833	21	13385	637
Australia	25	188864	7555	43	97004	2256	62	192700	3108
New Zealand	7	26542	3792	-	-	-	59	229681	3893
				-	-	-	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Rep. SAF	423	319480	755	142	50225	355	100	72882	729
Salvador	-	-	-	17	24428	1436	-	-	-
Colombia	-	-	-	28	21287	760	-	-	-
Argentina	-	-	-	5	34154	6830	-	-	-
Denmark	-	-	-	8	18603	2325	-	-	-
Netherlands	-	-	-	28	38606	1379	15	13541	903
Poland	-	-	-	16	65349	4084	3	95000	31667
Syria	-	-	-	1	12338	12338	-	-	-
S. Arab	-	-	-	8	25941	3242	-	-	-
Thailand	-	-	-	24	20008	834	70	29560	422
S. Vietnam	-	-	-	7	14241	2034	119	22420	188
Kor. Rep.	-	-	-	8	59847	7481	-	-	-
Nigeria	-	-	-	13	26945	2073	-	-	-
Ghana	-	-	-	-	-	-	8	15028	1879
Other city	525	147839	284	369	184367	500	290	163822	565
Total	3994	6574349	1646	2443	5754019	2355	2505	3758138	1500
Engine Lathes (7151036)									
Canada	495	477055	964	623	1053255	1690	305	701901	2301
Mexico	422	492101	1166	192	215182	1120	107	322012	3009
Colombia	44	60217	1369	-	-	-	6	25723	4287
Venezuela	39	42052	1078	8	32651	4081	18	43717	2429
Surinam	47	36825	784	-	-	-	-	-	-
Ecuador	19	20319	1069	24	72587	3025	14	16384	1170
British Guiana	5	42132	8426	3	14668	4889	-	-	-
Peru	12	12527	1044	-	-	-	5	15090	3018
Chile	181	462858	2558	21	95411	4543	-	-	-
Brazil	87	50158	576	4	45521	11380	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Argentina	1	29158	29158	-	-	-	73	94790	1298
Sweden	11	230077	20916	5	33037	6607	-	-	-
U.K.	559	93479	167	108	155612	1441	12	20998	1750
Belgium	47	36935	785	-	-	-	-	-	-
Turkey	32	97105	5333	59	182097	3086	26	134620	5178
Lebanon	14	14421	1030	-	-	-	-	-	-
Arabia	6	40726	6787	-	-	-	-	-	-
Afghanistan	86	18194	212	-	-	-	-	-	-
India	38	270559	7119	63	145529	2310	5	68175	13635
Pakistan	110	145466	1322	78	322656	4137	43	47566	1106
Thailand	32	96815	3025	28	15060	538	12	23933	1994
S. Vietnam	14	37480	2677	8	15738	1967	46	52973	1152
Phil. Rep.	27	21993	815	19	26466	1393	22	35478	1613
Japan	7	46034	6576	-	-	-	136	534287	3929
Egypt	7	51730	4533	-	-	-	-	-	-
Ghana	27	28896	1070	41	45261	1104	-	-	-
Rep. S&F	152	81165	534	17	18741	1102	-	-	-
Guatemala	-	-	-	7	12902	1843	-	-	-
Costa Rica	-	-	-	9	19347	2150	15	35931	2395
Panama	-	-	-	3	27631	9210	-	-	-
Jamaica	-	-	-	24	40255	1677	51	75061	1472
Finland	-	-	-	3	37012	12337	-	-	-
Netherlands	-	-	-	7	68487	9784	-	-	-
Switzerland	-	-	-	3	34475	11492	-	-	-
Spain	-	-	-	1	122341	122341	-	-	-
Italy	-	-	-	25	60345	2414	-	-	-
Laos	-	-	-	12	33673	2806	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Engine Lathe (cont'd)									
NAN IS	-	-	-	7	20512	2930	-	-	-
Nigeria	-	-	-	4	15717	3929	2	11205	5603
Nicaragua	-	-	-	-	-	-	8	18060	2258
Bahamas	-	-	-	-	-	-	5	19173	3835
Dominican Rep.	-	-	-	-	-	-	17	36963	2174
Trinidad	-	-	-	-	-	-	4	16242	4061
France	-	-	-	-	-	-	6	13649	2275
West Germany	-	-	-	-	-	-	5	41259	8252
Iran	-	-	-	-	-	-	1	18800	18800
Kor. Rep.	-	-	-	-	-	-	122	126222	1035
Taiwan	-	-	-	-	-	-	6	26062	4344
Guinea	-	-	-	-	-	-	6	13635	2273
Other city	253	156011	617	111	142506	1284	133	132659	997
Total	2774	3172488	1144	1517	3124675	2060	1211	2722568	2248

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Turret Lathes (Other than Vertical) (7151038)									
Canada	32	324633	10145	48	365645	7618	57	711169	12477
Mexico	116	267463	2306	33	191082	5790	18	96836	5380
Venezuela	5	34496	6899	-	-	-	2	13183	6592
Chile	13	16267	1251	1	30713	30713	-	-	-
Argentina	6	224199	37366	2	104532	52266	-	-	-
Sweden	16	1253861	78366	1	49152	49152	1	69060	69060
U.K.	7	403487	57641	10	256527	23653	17	182331	10725
Netherlands	1	40255	40255	-	-	-	1	25800	25800
France	5	118660	23732	5	247577	49515	-	-	-
Switzerland	2	60309	30154	2	65276	32638	-	-	-
Spain	2	17450	8725	13	25383	1953	-	-	-
Turkey	2	13707	6854	-	-	-	-	-	-
India	8	276043	34505	8	289976	36247	18	763305	42406
Australia	1	53469	53469	2	79621	39811	2	78394	39197
Ireland	-	-	-	3	15320	5107	-	-	-
Italy	-	-	-	1	20671	20671	4	85136	21284
Pakistan	-	-	-	5	23949	4790	-	-	-
Phil. Rep.	-	-	-	5	57870	11574	-	-	-
Egypt	-	-	-	1	44044	44044	-	-	-
Rep. SAF	-	-	-	1	15000	15000	-	-	-
Dominical Rep.	-	-	-	-	-	-	-	-	-
Brazil	-	-	-	-	-	-	2	16000	8000
Denmark	-	-	-	-	-	-	10	24000	2400
Belgium	-	-	-	-	-	-	2	23370	11685
Other city	15	28874	1925	54	37433	693	2	100567	50284
Total	231	3133173	13564	195	1899771	9742	155	2207987	14245

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Automatic Chucking Lathes (Single Spindle)(7151040)									
Canada	45	1509399	33540	69	1796960	26043	68	1674420	24624
Mexico	18	286462	15915	5	137827	27565	3	47215	15738
Chile	2	14964	7482	-	-	-	1	30717	30717
Argentina	6	286308	47718	2	63410	31705	-	-	-
Sweden	5	255445	51089	1	160965	160965	-	-	-
U.K.	13	389395	29953	42	911417	21700	36	276233	7683
France	6	213747	35625	4	138610	34653	-	-	-
West Germany	1	38680	38680	-	-	-	-	-	-
Spain	9	277355	30817	2	101325	50663	1	38007	38007
Italy	1	66238	66238	10	244939	24494	24	96825	4034
India	53	136859	2582	23	665111	28918	42	1156347	27532
Japan	22	1442821	65583	16	300178	18761	2	242370	121185
Rep. SAF	6	283234	47205	9	162770	18085	1	18293	18293
Salvador	1	12904	12904	-	-	-	-	-	-
Surinam	1	76873	76873	-	-	-	-	-	-
Netherlands	13	211561	16274	-	-	-	-	-	-
Honduras	-	-	-	1	14000	14000	-	-	-
Denmark	-	-	-	2	49574	24787	1	46411	46411
Australia	-	-	-	10	103502	10350	9	232317	25813
Brazil	-	-	-	-	-	-	2	51153	25577
Netherlands	-	-	-	-	-	-	1	36695	36695
Other city	15	11264	751	12	31213	2601	9	32838	3649
Total	217	5513509	25408	208	4881801	23470	200	3979842	19899

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Automatic Chucking Lathes (Multiple Spindle) (7151042)									
Canada	15	745877	49725	25	926863	37075	24	530971	22124
Mexico	4	40711	10178	5	101485	20297	-	-	-
Argentina	2	115048	57524	-	-	-	4	355628	88907
Sweden	2	64418	32209	-	-	-	-	-	-
U.K.	3	198407	66135	5	172956	34591	17	598484	35205
Netherlands	4	342000	85500	-	-	-	-	-	-
France	1	42209	42209	7	140264	20038	4	265806	66452
West Germany	2	27446	13723	-	-	-	2	105636	52818
Spain	4	376772	94193	4	135227	33807	-	-	-
Italy	4	174340	43585	6	387020	64503	2	148741	74371
India	3	189812	63271	6	289671	48279	5	377543	75509
Japan	14	1081321	77237	13	212481	16345	1	113724	113724
Australia	11	689996	62727	1	14750	14750	2	87323	43662
Guatemala	-	-	-	1	14960	14960	-	-	-
Israel	-	-	-	1	41071	41071	-	-	-
Egypt	-	-	-	2	117538	58769	-	-	-
Venezuela	-	-	-	-	-	-	1	15500	15500
Brazil	-	-	-	-	-	-	1	62021	62021
Other city	5	15165	3033	4	10468	2617	3	1055	352
Total	74	4103522	55453	80	2564754	32059	66	2662432	40340

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Automatic Screw Machines (7151044)									
Canada	51	1476410	28949	72	1723501	23938	76	1306885	17196
Mexico	15	199825	13322	10	132040	13204	-	-	-
Venezuela	2	23500	11750	-	-	-	-	-	-
Sweden	2	74697	37349	-	-	-	-	-	-
Finland	2	83298	41649	-	-	-	-	-	-
U.K.	28	726207	25936	24	535037	22293	25	406084	16243
Netherlands	5	249900	49980	16	340068	21254	2	20925	10463
Belgium	3	81053	27018	4	86435	21609	-	-	-
France	4	34426	8607	3	125434	41811	5	101743	20349
West Germany	2	24993	12497	-	-	-	1	45307	45307
Switzerland	1	51514	51514	2	70126	35026	-	-	-
Spain	7	231921	33132	18	957667	53204	5	279618	55924
Italy	6	255881	42647	13	599873	46144	27	1154399	42756
Turkey	3	34970	11657	2	17047	8524	-	-	-
India	11	325806	29619	7	345525	49360	18	1136630	63146
Japan	22	586653	26666	2	92590	46295	13	344679	26514
Australia	3	92669	30889	2	25952	12976	3	67198	22399
Rep. SAF	2	27553	13777	-	-	-	-	-	-
Ireland	-	-	-	8	54831	6854	-	-	-
Brazil	-	-	-	1	33047	33047	1	25850	25850
New Zealand	-	-	-	2	20432	10216	-	-	-
Argentina	-	-	-	-	-	-	2	122200	61100
Other city	15	5422	361	5	26125	5225	3	22641	7547
Total	184	4586698	24928	191	5185730	27150	181	5034159	27758

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Lathes, Nec, Metal-Cutting New (7151046)									
Canada	54	250546	4639	117	467125	3993	94	348228	3705
Mexico	68	570266	8386	73	164859	2258	49	88951	1815
Colombia	4	20388	5097	-	-	-	-	-	-
Venezuela	32	35925	1123	20	21574	1079	24	64712	2696
Chile	11	84172	7652	-	-	-	23	33312	1448
Argentina	2	31966	15983	2	29792	14896	-	-	-
Sweden	9	297173	33019	9	14183	1576	-	-	-
Finland	20	36793	1839	-	-	-	-	-	-
Denmark	5	16468	3294	-	-	-	-	-	-
Netherlands	2	12500	6250	11	73571	6688	-	-	-
France	23	123958	5389	-	-	-	-	-	-
West Germany	22	436011	19819	22	105665	4803	-	-	-
Italy	14	185141	13224	-	-	-	5	19650	3930
Israel	6	12318	2053	-	-	-	23	17742	771
India	10	24597	2459	2	12356	6178	25	23934	957
Ceylon	6	16344	2724	-	-	-	-	-	-
Vietnam	3	175331	58444	-	-	-	-	-	-
Phil. Rep.	29	70567	2433	-	-	-	7	176634	25233
Korea	1	31500	31500	-	-	-	-	-	-
Japan	11	269352	24487	-	-	-	3	185600	61867
Australia	10	42746	4275	17	44441	2614	29	206162	7109
Sierra Leone	1	30646	30646	-	-	-	-	-	-
Rep. SAF	20	66885	3344	17	15576	916	9	290134	32237
Jamaica	-	-	-	3	15036	5012	-	-	-
Peru	-	-	-	16	67741	4234	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
U.K.	-	-	-	18	80198	4455	-	-	-
France	-	-	-	18	54323	3018	-	-	-
Spain	-	-	-	31	62940	2080	16	12027	752
Turkey	17	52572	3092	23	584188	25399	25	124912	4996
Iran	-	-	-	4	16562	4141	4	11608	2902
Thailand	-	-	-	20	23528	1176	21	28862	1374
Liberia	-	-	-	3	22782	7594	-	-	-
Dom. Rep.	-	-	-	-	-	-	14	35709	2551
Brazil	-	-	-	-	-	-	2	39389	19695
Belgium	-	-	-	-	-	-	3	61473	20491
Pakistan	-	-	-	-	-	-	6	78127	13021
Taiwan	-	-	-	-	-	-	4	28830	7208
Other countries	212	134920	636	106	124658	1176	115	135725	1180
Total	592	3029085	5117	549	2135326	3890	501	2011721	4015
Milling Machine (7151048)									
Canada	104	449239	4319	141	736674	52247	231	1040214	4503
Mexico	56	361921	6463	45	223747	4972	41	126840	3094
Venezuela	3	28929	9643	-	-	-	6	42460	7077
Chile	4	79054	19764	-	-	-	-	-	-
Sweden	2	70125	35063	1	15796	15796	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
U.K.	12	157414	13118	68	296315	4358	52	452188	8696
Netherlands	2	17115	8558	3	15693	5231	1	14000	14000
France	2	20137	10069	11	36502	3318	-	-	-
West Germany	12	34965	2914	5	52319	10464	-	-	-
Italy	7	63000	9000	-	-	-	1	35250	35250
Turkey	10	71096	7109	4	64376	16094	-	-	-
Israel	19	55341	2913	13	28206	2170	7	24515	3502
Afghanistan	1	12425	12425	1	12666	12666	-	-	-
India	14	194540	13896	16	306170	19136	-	-	-
Vietnam	1	16470	16470	-	-	-	-	-	-
Hongkong	11	29043	2640	12	66241	5520	3	12031	4010
Taiwan	6	20232	3372	-	-	-	2	26550	13275
Japan	3	14027	4676	13	106534	8194	-	-	-
Australia	2	44776	22388	34	81563	2399	-	-	-
New Zealand	3	16736	5579	-	-	-	-	-	-
Egypt	2	22559	11279	-	-	-	-	-	-
Rep. SAF	9	354726	39414	9	13237	1470	-	-	-
Colombia	-	-	-	5	39135	7827	-	-	-
Pakistan.	-	-	-	2	20722	10361	6	57798	9633
NAN IS	-	-	-	1	18740	18740	-	-	-
Jamaica	-	-	-	-	-	-	3	48470	16157
LW WW I	-	-	-	-	-	-	1	19111	19111
Peru	-	-	-	-	-	-	4	77920	19480
Brazil	-	-	-	-	-	-	9	126829	14092
Iran	-	-	-	-	-	-	2	17251	8626
Kor. Rep.	-	-	-	-	-	-	3	27350	9117
Congo	-	-	-	-	-	-	2	18263	9132
Other city	20	57824	2891	21	69138	3292	39	54438	1396
Total	305	2191694	7186	410	2222007	5420	413	2221478	5379

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	value US \$	Average value US \$	No.	Value US \$	Average value US \$
Milling Machines									
Bed-Type (7151050)									
Canada	12	316350	26363	13	359473	27652	10	1332578	133258
Mexico	10	199467	19947	8	19119	2390	2	21655	10828
Chile	3	30376	10125	-	-	-	-	-	-
Argentina	2	79937	38469	-	-	-	-	-	-
Sweden	1	17151	17151	1	25000	25000	-	-	-
U.K.	1	26000	26000	2	77272	38636	3	71912	23971
Italy	1	68670	68670	-	-	-	-	-	-
India	5	59716	11943	5	268484	53697	7	215258	30751
Rep. SAF	8	224679	28085	-	-	-	2	49678	24839
Netherlands	-	-	-	8	25694	3212	-	-	-
France	-	-	-	13	829663	63820	-	-	-
West Germany	-	-	-	1	62982	62982	-	-	-
Pakistan	-	-	-	2	14000	7000	-	-	-
Brazil	-	-	-	-	-	-	9	100804	11200
Spain	-	-	-	-	-	-	1	39869	39869
Israel	-	-	-	-	-	-	1	13149	13149
Other city	10	33840	3384	10	35742	3574	2	19876	9938
Total	53	1053186	13871	63	1717429	17261	37	1864779	50399
Milling Machines, Profile, Duplicating (7151052)									
Canada	41	810695	19773	41	359815	8776	18	1522153	84564
Mexico	15	51999	3467	67	258362	3856	16	40163	2510
Brazil	16	241883	15118	10	426245	42625	4	276709	69177
U.K.	52	128321	2468	21	129150	6150	48	97342	2028
France	113	48741	431	24	70271	2928	14	92381	6599

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Switzerland	210	19047	91	68	63687	937	40	64464	1612
India	27	172075	6373	124	680450	5488	1	113741	113741
Hong Kong	3	14620	4873	-	-	-	-	-	-
Japan	6	582380	97063	3	22811	7605	9	225862	25096
Australia	18	257832	14324	-	-	-	20	390140	19507
Colombia	-	-	-	7	18744	2678	-	-	-
Argentina	-	-	-	1	140876	140876	2	64166	32083
Sweden	-	-	-	4	382539	95635	-	-	-
South Vietnam	-	-	-	2	12996	6498	-	-	-
Venezuela	-	-	-	-	-	-	1	16390	16390
Netherlands	-	-	-	-	-	-	2	179643	89322
Spain	-	-	-	-	-	-	4	115957	28989
Italy	-	-	-	-	-	-	2	36474	18237
Other City	35	51781	1479	99	55490	561	6	16214	2702
Total	536	2379374	4439	471	2621436	5566	187	3251799	17389
Milling Machines (7151054)									
Canada	20	397134	19857	38	762544	20067	14	972794	69485
Mexico	11	107316	9756	9	44983	4998	-	-	-
Brazil	4	35165	8791	2	53291	16646	6	68533	11422
Argentina	1	23042	25042	2	18286	9143	1	12695	12695
Sweden	7	241073	34439	1	58467	58467	2	291850	145925
U.K.	9	89589	9954	7	53222	7603	9	381402	42378
Netherlands	6	43566	7261	2	20764	10382	4	39977	9994
Belgium	3	23063	7688	-	-	-	3	33000	11000
France	4	144630	36158	19	570513	30027	7	174838	24977
West Germany	2	174742	87371	-	-	-	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Spain	2	40350	20175	2	15891	7946	1	36583	36583
Turkey	6	16015	2669	3	20695	6898	-	-	-
India	3	15941	5314	10	583210	58321	5	124984	24997
Pakistan	1	20565	20565	3	67544	22575	-	-	-
Japan	3	242575	80858	-	-	-	-	-	-
Australia	4	124768	31192	1	38936	38936	3	117642	39214
Ghana	1	35949	35949	-	-	-	-	-	-
Rep. SAF	2	53851	26926	5	13050	2610	4	151856	37964
Guyana	-	-	-	2	12750	6375	-	-	-
Nicarag.	-	-	-	-	-	-	1	14295	14295
Colombia	-	-	-	-	-	-	-	-	-
Finland	-	-	-	-	-	-	2	17028	8514
Hungary	-	-	-	-	-	-	1	54869	54869
Switzerland	-	-	-	-	-	-	2	320000	160000
Italy	-	-	-	-	-	-	2	52031	26016
Israel	-	-	-	-	-	-	10	355267	35527
Thailand	-	-	-	-	-	-	6	16279	2713
Kor. Rep.	-	-	-	-	-	-	1	13968	13968
Hong Kong	-	-	-	-	-	-	9	86463	9607
Taiwan	-	-	-	-	-	-	7	23276	3325
Other City	5	9913	1983	-	-	-	5	36308	7262
Total	94	1839247	19566	22	64320	2924	3	9077	3026
				128	2378466	18582	108	3405015	31528
Broaching Machines (7151056)									
Canada	46	1582422	30053	72	1560225	21670	29	549143	18936
Mexico	10	83194	8319	4	20408	5102	-	-	-
U.K.	4	508140	127035	10	242814	24281	5	854781	170956
Netherlands	7	802426	114632	1	75000	75000	-	-	-
France	3	133670	44557	2	154017	77008	3	151020	50340

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Italy	4	172382	44596	3	425795	14193	8	797752	99719
India	8	166839	20855	7	121546	17363	3	261454	87151
Japan	17	946201	55659	1	88351	88351	6	232366	38728
Brazil	-	-	-	6	20950	3492	-	-	-
Switzerland	-	-	-	1	12600	12600	-	-	-
Spain	-	-	-	7	404545	57792	-	-	-
Egypt	-	-	-	1	95198	95198	-	-	-
West Germany	-	-	-	-	-	-	3	86664	28888
Taiwan	-	-	-	-	-	-	1	21000	21000
Australia	-	-	-	-	-	-	5	112042	22408
Other City	6	22569	3762	2	13255	6628	8	24079	3010
Total	105	4223843	40227	117	3234704	27647	71	3090501	43525
Planers, Other than Gear									
Planers (7151058)									
Canada	7	68500	9786	8	69550	8694	6	49309	8218
Mexico	11	296327	26939	-	-	-	3	39603	13201
Colombia	2	17800	8900	-	-	-	3	14943	4981
Venezuela	4	31717	7929	3	17754	5918	-	-	-
Belgium	4	36300	9075	-	-	-	-	-	-
India	2	14122	7061	-	-	-	-	-	-
Palestine	5	76809	14762	5	388000	77600	1	23917	23917
Phil. Rep.	5	16500	2700	-	-	-	-	-	-
Panama	-	-	-	11	20016	1824	-	-	-
France	-	-	-	5	41052	8210	-	-	-
Japan	-	-	-	3	42104	14035	2	34367	12134
Cambal	-	-	-	-	-	-	1	12250	12250
Other City	6	11658	1943	12	8535	711	10	31671	3167
Total	46	563733	12255	47	587713	12501	26	186563	7176

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Shapers and Slotters (7151060)									
Canada	92	512967	5576	51	82746	1623	50	95386	1908
Mexico	38	91607	2411	24	53520	2280	25	98195	3928
Colombia	7	14533	2076	-	-	-	-	-	-
Venezuela	8	29705	3713	-	-	-	-	-	-
Surinam	1	15117	15117	-	-	-	-	-	-
Chile	8	69488	8686	-	-	-	-	-	-
Sweden	1	17781	17781	-	-	-	-	-	-
U.K.	15	99174	6612	10	14729	1473	-	-	-
Belgium	28	64096	2289	12	79182	6599	-	-	-
France	13	57217	4401	-	-	-	3	15893	5298
Switzerland	42	16728	398	120	120085	1001	49	34150	697
Poland	1	15999	15999	2	96789	48395	-	-	-
Spain	19	14992	789	19	15287	805	1	42827	42827
Italy	2	89368	44684	-	-	-	-	-	-
Turkey	6	153319	25553	-	-	-	3	39894	13238
India	7	44188	6313	13	99597	7661	12	31799	2650
Japan	23	94830	4123	37	37288	1008	-	-	-
Australia	4	43381	10845	8	60244	7531	-	-	-
Ghana	1	15010	15010	-	-	-	-	-	-
Rep. SAF	7	12806	1829	-	-	-	5	55806	11161
Iran	-	-	-	52	95203	1831	-	-	-
Pakistan	-	-	-	9	82321	9146	2	11343	5672
S. Vietnam	-	-	-	2	12260	6310	-	-	-
Phil. Rep.	-	-	-	3	21393	7131	8	21762	2720
Nigeria	-	-	-	9	19411	2123	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Panama	-	-	-	-	-	-	3	11179	3726
Brazil	-	-	-	-	-	-	10	16252	1625
Afghanistan	-	-	-	-	-	-	1	12726	12726
Kor. Rep.	-	-	-	-	-	-	2	11018	5509
Guinea	-	-	-	-	-	-	6	14028	2338
Other City	47	65661	1397	86	75256	875	62	75368	1216
Total	370	1537967	4157	457	965371	2112	242	587626	2428
Sawing and Cut-off Machines (7151062)									
Canada	650	1288257	1982	1003	1497735	1493	946	1789233	1891
Mexico	166	234615	1413	72	92731	1288	82	124646	1520
Columbia	9	21287	2365	18	23219	1290	-	-	-
Venezuela	30	49726	1658	44	109456	2488	36	100269	1166
Surinam	11	86926	7902	-	-	-	-	-	-
Peru	11	12262	1115	-	-	-	-	-	-
Chile	37	73312	1981	-	-	-	-	-	-
Brazil	14	53291	3807	12	43087	3591	14	44480	3177
Argentina	7	40520	5789	4	25191	6299	-	-	-
Sweden	23	38635	1679	28	67592	2414	46	24355	529
Finland	16	46656	2916	24	27086	1129	9	54037	6004
U.K.	95	334015	3592	63	240290	3314	106	239749	2362
Netherlands	21	89842	4278	49	53481	1091	46	17630	1035
Belgium	59	58773	1507	30	60425	2014	16	32174	3011
France	27	120529	4464	55	154171	2805	164	481639	2937

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
West Germany	43	173530	4036	31	114270	3686	57	115201	2041
Switzerland	56	68057	1215	40	23208	580	8	46247	5781
Spain	5	29322	5864	26	76302	2935	20	38361	1918
Italy	13	29783	2291	38	154577	4068	57	195427	3429
Turkey	13	25811	1985	90	79175	880	6	25658	4276
Israel	12	23557	1963	-	-	-	8	13327	1666
India	50	128261	2565	24	513890	21412	6	39797	6633
Phil. Rep.	3	16009	5336	-	-	-	10	20934	2093
Japan	37	179428	4730	13	35108	2700	36	146723	4076
Australia	72	132345	1838	56	96511	1721	126	99330	788
New Zealand	13	41743	3211	-	-	-	-	-	-
Congo	4	21368	5342	14	17914	1280	20	22230	1112
Rep. SAF	26	96700	3719	56	29841	829	15	21337	1122
Austria	-	-	-	25	14707	588	-	-	-
Iran	-	-	-	13	43243	526	12	25424	2119
Pakistan	-	-	-	30	16895	563	-	-	-
Thailand	-	-	-	6	27994	4666	-	-	-
Ghana	-	-	-	26	70944	2729	-	-	-
Jamaica	-	-	-	-	-	-	9	21386	2373
Denmark	-	-	-	-	-	-	20	47264	2363
Ireland	-	-	-	-	-	-	6	15393	2566
Czechos.	-	-	-	-	-	-	1	150630	150630
S. Vietnam	-	-	-	-	-	-	37	41670	1126
Kor. Rep.	-	-	-	-	-	-	5	21357	4271
Other City	169	144180	853	214	203869	953	169	161949	958
Total	1670	3658740	2191	2081	3912915	1880	2143	4207862	1964

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Tapping Machines (7151064)									
Canada	48	175999	3667	55	187477	3409	116	403058	3475
Mexico	9	92727	10303	6	59893	9982	22	37376	1699
Guatemala	5	18724	3745	-	-	-	-	-	-
N. Antil	6	14339	2390	-	-	-	-	-	-
U.K.	58	145888	2515	36	206504	5736	16	99953	6247
Netherlands	15	15622	1041	4	18993	4743	9	77293	8539
France	8	35892	4487	-	-	-	24	40177	1674
West Germany	29	92027	3180	4	43620	10905	15	17510	1347
Italy	36	60312	1675	8	49458	6182	8	65625	8203
S. Arab	4	12385	3221	-	-	-	-	-	-
Pakistan	9	18101	2001	-	-	-	-	-	-
Japan	4	79300	19325	-	-	-	10	12440	1244
Libya	12	173124	14427	-	-	-	-	-	-
Rep. SAF	14	155150	11082	-	-	-	1	30100	30100
Brazil	-	-	-	2	55075	27538	6	11079	1847
Sweden	-	-	-	15	34914	2323	-	-	-
Ireland	-	-	-	30	125434	4181	27	99423	3682
Venezuela	-	-	-	-	-	-	5	16722	3344
Belgium	-	-	-	-	-	-	13	22514	1732
Iraq	-	-	-	-	-	-	5	15967	4656
Iran	-	-	-	-	-	-	10	13417	1945
India	-	-	-	-	-	-	5	169958	33992
Australia	-	-	-	-	-	-	14	103907	7422
Other City	57	46815	821	103	104755	1017	51	68572	1341
Total	314	1139905	3620	263	886123	3369	353	1308926	3708

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Threading Machines (7151066)									
Canada	247	289706	1173	332	235757	710	233	191295	821
Mexico	95	130036	1369	163	162297	996	167	171662	1028
Venezuela	179	80681	451	149	73630	494	152	71454	470
Ecuador	6	12269	2045	-	-	-	3	13085	4562
Peru	22	17014	773	-	-	-	-	-	-
Chile	21	37247	1774	-	-	-	13	37932	2922
Argentina	17	19987	1176	-	-	-	10	83056	8396
Norway	27	17498	648	39	15985	410	-	-	-
Denmark	360	253220	703	532	294224	553	355	255701	720
U.K.	394	393747	999	599	324697	542	410	263528	629
Netherlands	103	151440	1470	77	74316	965	25	11983	479
Belgium	543	280778	517	253	152917	604	107	58823	550
West Germany	110	264201	2402	210	172893	823	41	87036	1978
Switzerland	83	31698	388	97	60750	626	146	41495	284
Turkey	14	17788	1271	-	-	-	-	-	-
Israel	94	49930	531	109	119577	1037	-	-	-
India	137	125731	918	13	30623	2356	9	82958	9218
Phil. Rep.	32	20354	636	48	16523	344	39	24437	627
Japan	225	87243	388	204	90412	443	135	86698	642
Australia	90	62051	689	84	92813	1105	61	50401	826
New Zealand	32	17619	552	33	12157	368	30	13958	465
Rep. SAF	114	244115	2141	41	20004	488	258	106541	413
ZRH Ma	23	13730	597	-	-	-	-	-	-
Bahamas	-	-	-	6	12525	2088	-	-	-
Colombia	-	-	-	27	15449	572	14	16515	1180
Brazil	-	-	-	17	17322	1019	-	-	-
Sweden	-	-	-	39	18521	474	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Austria	-	-	-	94	32685	348	50	20079	402
Spain	-	-	-	148	68941	466	46	23142	503
Italy	-	-	-	41	52423	1279	18	24238	1347
Iran	-	-	-	21	14071	670	2	81418	40709
Hong Kong	-	-	-	30	17854	595	-	-	-
France	-	-	-	-	-	-	49	58873	1201
S. Arab	-	-	-	-	-	-	11	14542	1322
Thailand	-	-	-	-	-	-	33	13586	412
Nan IS	-	-	-	-	-	-	13	11597	892
Other City	231	147202	637	304	208241	685	265	128818	486
Total	3199	2765315	864	3710	2407607	649	2707	2045801	756
Multi-Station Machines (7151068)									
Canada	95	12224564	128680	92	6921159	75239	53	3597725	67882
Mexico	2	20614	10307	11	439589	39963	1	28634	28634
U.K.	24	5249477	218728	35	5707801	163080	62	13313701	214737
Netherlands	2	250644	125322	-	-	-	-	-	-
France	29	1170674	40368	-	-	-	5	498520	99704
West Germany	10	3017164	301716	16	4713693	294606	9	1011400	112379
Spain	1	94791	94791	2	312906	156453	1	98854	98854
Italy	18	1187888	65994	7	1346019	192288	2	176192	88096
Yugoslav.	2	190851	95426	-	-	-	-	-	-
Japan	3	244362	81454	1	793499	793499	1	30900	30900
Australia	10	2138478	213848	3	94995	31665	5	1169280	233856
Sweden	-	-	-	1	26500	26500	1	112591	112591
Belgium	-	-	-	3	161370	53790	-	-	-
India	-	-	-	9	1834836	203871	12	2941396	245116
Other City	11	2515	229	5	17773	3555	1	6278	6278
Total	207	25792022	124599	185	22370140	120920	153	22935480	150232

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Metal-Cutting Machines Tools (7151070) N.E.S.									
Canada	739	1551922	2100	1051	1493218	1421	842	962609	1143
Mexico	405	273762	676	257	152148	592	173	143066	827
Colombia	40	142154	3729	-	-	-	18	22466	1248
Venezuela	95	43378	457	218	61585	283	143	101165	707
Chile	42	46398	1105	29	58314	2011	10	16137	1614
Argentina	13	17428	1341	89	106287	1194	-	-	-
U.K.	259	636118	2456	132	319212	2418	196	975613	4978
Netherlands	39	381127	9772	112	49646	443	33	23257	705
Belgium	139	67274	484	-	-	-	-	-	-
France	240	191165	797	36	150785	4188	74	98838	1336
West Germany	138	352123	2552	103	274926	2660	69	151818	2200
Switzerland	66	23711	359	47	13131	385	23	15091	656
Spain	8	440585	55073	116	151440	1306	22	266243	12102
Italy	31	64896	2093	7	150736	21553	61	172717	2831
Iran	11	24882	2262	-	-	-	78	43869	562
S. Arab	4	13563	3391	-	-	-	-	-	-
Arabia	14	17130	1224	-	-	-	-	-	-
Afghanistan	4	14983	3746	-	-	-	-	-	-
India	59	109663	1850	26	513725	12066	134	338048	2523
Pakistan	51	42903	841	-	-	-	-	-	-
S. Vietnam	112	40108	358	270	150200	556	56	28600	794
Phil. Rep.	16	12933	808	47	22190	472	91	74649	820
Japan	312	200946	644	500	549108	1098	144	96241	668
Australia	178	47956	269	61	381829	6259	161	187417	1164
New Zealand	31	58598	1890	-	-	-	-	-	-

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Rep. SAF	71	86213	1214	73	21229	291	82	35843	437
Peru	-	-	-	21	102211	4867	-	-	-
Brazil	-	-	-	32	41321	1291	63	26209	416
Ireland	-	-	-	59	28039	475	-	-	-
Yugoslav.	-	-	-	1	122995	122995	-	-	-
Israel	-	-	-	78	26173	336	75	26668	355
Kuwait	-	-	-	31	17940	579	17	13240	779
Egypt	-	-	-	11	86040	7822	-	-	-
Nigeria	-	-	-	41	58434	1425	-	-	-
Panama	-	-	-	-	-	-	22	14161	644
Jamaica	-	-	-	-	-	-	47	42855	912
N. Antil	-	-	-	-	-	-	8	15179	1897
Equador	-	-	-	-	-	-	3	20289	6763
Sweden	-	-	-	-	-	-	16	11394	712
Ireland	-	-	-	-	-	-	4	24778	6135
USSR	-	-	-	-	-	-	31	423860	13673
Turkey	-	-	-	-	-	-	13	34137	2626
Kor. Rep.	-	-	-	-	-	-	4	13114	3279
Other City	272	189259	696	384	194309	506	219	111760	510
Total	3389	5091178	1502	3832	5101271	1336	2862	4531331	1583

Appendix 23 (cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Metal-cutting machine tool (used) (7151072)									
Canada	581	973109	1675	1379	2589779	1878	854	1299195	1521
Mexico	988	349606	354	718	1895717	2640	618	2392768	5872
Salvador	3	14575	4858	41	28180	687	-	-	-
Bahamas	12	21438	1786	-	-	-	-	-	-
Colombia	582	126979	218	-	-	-	-	-	-
Venezuela	22	43750	1989	18	207081	11505	19	37389	1968
Peru	5	16439	3288	12	168844	14070	-	-	-
Bolivia	11	12919	1174	5	19950	3990	-	-	-
Chile	145	102583	707	-	-	-	-	-	-
Brazil	124	96282	776	22	167586	7618	6	268691	44782
Argentina	82	344727	4204	48	473368	9862	393	498797	1269
Denmark	4	27466	6866	-	-	-	-	-	-
UK	523	1057023	3273	56	225189	4021	39	115079	2951
Ireland	148	29479	199	-	-	-	-	-	-
Netherlands	22	65894	2995	-	-	-	-	-	-
Belgium	747	294467	394	60	399311	6655	32	152010	4750
France	32	33836	1057	18	65107	3617	19	99331	5228
West Germany	84	108245	1289	19	76423	4022	17	32758	1927
Switzerland	33	14529	440	-	-	-	12	22244	1854
Italy	25	116650	4666	29	182111	6280	39	64522	1654

Type (SLIC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value	Average value	No.	Value	Average value	No.	Value	Average value
Israel	8	78733	9841	-	-	-	-	-	-
India	122	257759	2113	145	116959	807	-	-	-
Pakistan	90	785847	8731	6	35893	5932	-	-	-
Phil R	29	39832	1373	-	-	-	25	35743	1430
Japan	8	225494	28187	9	245669	27297	325	305212	939
Australia	41	236534	5769	17	133399	7847	14	236687	16906
New Zealand	2	15835	7917	-	-	-	-	-	-
Rep. S. Afr	47	815506	17351	247	641780	2592	23	465993	20261
Jamaica	-	-	-	20	37577	1879	-	-	-
Spain	-	-	-	6	14003	2334	25	22812	912
Yugoslavia	-	-	-	1	74426	74426	-	-	-
Turkey	-	-	-	11	14019	1274	-	-	-
Taiwan	-	-	-	6	67954	11326	6	32219	5370
Dominion Rep	-	-	-	-	-	-	12	12821	1066
Sweden	-	-	-	-	-	-	71	58854	829
Nan Islands	-	-	-	-	-	-	67	17302	258
Other City	178	83347	468	113	95252	843	120	63638	530
TOTAL	4498	9535293	2119	3006	7975577	2653	2736	6234065	2279

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
New Zealand	1	28555	28555	-	-	-	-	-	-
Egypt	8	22897	2862	-	-	-	-	-	-
Ghana	7	53342	7620	-	-	-	-	-	-
Rep. SAF	80	1470929	18387	1515	4242038	2800	754	1379186	1829
Salvador	-	-	-	13	25843	1988	1	15798	15798
Colombia	-	-	-	1	12500	12500	3	12835	4278
Netherlands	-	-	-	102	303045	2971	10	27522	2752
Austria	-	-	-	3	32805	10935	-	-	-
Greece	-	-	-	7	26226	3746	-	-	-
Phil. Rep.	-	-	-	15	23771	1584	32	899103	28097
Taiwan	-	-	-	31	47897	1545	11	20831	1894
Sp. Af O	-	-	-	74	61423	830	-	-	-
Nicaragua	-	-	-	-	-	-	2	24680	12340
Costa Rica	-	-	-	-	-	-	8	24610	3076
Peru	-	-	-	-	-	-	50	88679	1774
Pakistan	-	-	-	-	-	-	10	42270	4227
Other City	136	114491	842	105	88682	845	122	60342	495
Total	1233	5631630	4567	3549	9836854	2772	2244	5982536	2666

Appendix 23 (Cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value	Average value US \$
Bending and Forming Machine (7151076)									
Canada	816	2377233	2913	888	3014211	3394	757	2677095	3536
Mexico	183	753675	4418	224	1038592	4637	175	745246	4258
Nicaragua	10	19904	1990	15	28427	1895	14	57621	4116
C. Rica	20	92134	4607	16	54153	3384	32	145209	4538
Panama	6	14952	2492	-	-	-	13	47688	3668
Jamaica	18	33046	1836	22	51944	2361	20	116717	5836
Dome Rep.	5	27732	5546	-	-	-	20	39617	1981
Colombia	7	58880	8411	10	23315	2331	-	-	-
Venezuela	100	193787	1938	101	176592	1748	80	307754	3847
Peru	20	42964	1534	41	76578	1868	18	113356	6298
Chile	21	97392	4628	32	123059	3845	30	363159	12105
Brazil	19	34670	1825	5	65870	13174	144	227733	1581
Argentina	12	68390	5699	5	17862	3572	7	73966	10567
Sweden	67	331531	4948	45	92437	2054	27	121872	4514
Norway	14	20159	1439	25	38276	1531	16	162999	10187
Finland	3	35316	11772	2	16196	8098	5	15216	3043
Denmark	29	174187	6006	58	87977	1517	94	193429	2058
U.K.	111	773318	6967	125	644135	5153	218	1778608	8159
Ireland	11	53335	4849	2	43130	6565	7	57492	8213
Netherlands	22	188822	8582	59	285663	4842	25	292499	11700
Belgium	27	166972	6184	41	116147	2832	11	83164	7560
France	56	522118	9324	32	303833	9495	46	482358	10486

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
W. Germany	61	476944	7819	96	713613	7433	42	256288	6102
Switzerland	25	57378	2295	42	77958	1856	68	85220	1253
Spain	41	279068	6807	31	154766	4992	6	21278	3546
Italy	27	207049	7668	29	964277	33250	38	621286	16350
Yugoslavia	1	24190	24190	-	-	-	-	-	-
Turkey	14	23594	1685	21	26140	1245	20	60703	3035
Iran	14	126033	9002	10	42971	4297	41	1251759	30531
Israel	49	125574	2563	22	140387	6381	7	53799	7686
Kuwait	2	26385	13193	8	20486	2561	2	21580	10790
Saudi Arabia	4	21795	5448	-	-	-	9	29422	3269
India	61	280125	4592	55	447272	8132	8	124928	15616
Pakistan	17	83363	4904	-	-	-	-	-	-
Thailand	9	30935	3437	15	47384	3159	18	71641	3980
Malaysia	3	27954	9318	-	-	-	-	-	-
Phil. Rep.	31	95813	3091	23	56472	2455	59	243226	4122
Kor. Rep.	3	12391	4130	-	-	-	17	68711	4042
Japan	90	671506	7461	103	528205	5128	62	887038	14307
Nan Is.	26	88073	3387	-	-	-	16	16717	1045
Australia	50	565034	11301	69	678200	9829	76	231702	3049
New Zealand	14	87352	6239	3	16507	5502	17	61271	3604

Appendix 23 (cont'd)

Type (SITC) Country of Destination	1965			1966			1967 (Jan - Nov only)		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Libya	1	34549	34549	-	-	-	-	-	-
Egypt	5	13780	2756	-	-	-	-	-	-
Ghana	15	110296	7353	5	29787	5957	-	-	-
Rep. SAF	135	405423	3003	104	347159	3338	108	518782	2952
Z Ph. Ma	14	25665	1833	-	-	-	-	-	-
Salvador	-	-	-	9	108646	12072	11	28950	2632
Trinidad	-	-	-	11	30835	2803	-	-	-
Austria	-	-	-	7	78300	11186	-	-	-
Greece	-	-	-	6	139196	23199	-	-	-
Iraq	-	-	-	3	43130	14376	-	-	-
Taiwan	-	-	-	13	16049	1234	20	38410	1921
Guinea	-	-	-	9	21305	2367	-	-	-
Nigeria	-	-	-	3	28100	9366	-	-	-
Kenya	-	-	-	2	21551	10775	-	-	-
Guatemala	-	-	-	-	-	-	11	47663	4333
Honduras	-	-	-	-	-	-	12	39283	3274
Bahamas	-	-	-	-	-	-	7	15467	2210
Guyana	-	-	-	-	-	-	2	37382	18691
S. Vietnam	-	-	-	-	-	-	21	14615	696
Other City	86	91436	1063	165	167424	1015	71	91684	1291
Total	2383	10072227	4227	2612	11214517	4293	2528	12841613	5080

Type (SITC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Hydraulic and Pneumatic Presses (7151078)									
Canada	443	2637115	5953	716	2484826	3470	513	2032599	3962
Mexico	124	706360	5696	151	630397	4175	129	1154294	8793
Guatemala	12	13869	1156	-	-	-	-	-	-
Salvador	3	344043	114681	9	66462	7384	12	47909	3992
Jamaica	17	22722	1337	12	55582	4632	-	-	-
Colombia	4	15943	3986	10	28121	2812	4	12233	3058
Venezuela	91	217286	2388	69	142742	2069	61	100499	1648
Ecuador	2	12706	6353	-	-	-	-	-	-
Peru	9	102947	11439	-	-	-	36	57439	1597
Chile	11	67249	6114	12	15032	1253	15	31917	2128
Brazil	110	219528	1996	4	29670	7417	15	89013	5934
Argentina	10	20345	2035	7	46496	6642	8	66627	8328
Sweden	4	76552	19138	73	112606	1542	31	29117	939
Norway	2	47152	23576	2	27714	13857	-	-	-
U.K.	125	833055	6664	138	583276	4227	205	583018	2844
Ireland	3	53428	17809	52	65972	1269	10	48252	4825
Netherlands	25	266775	10671	10	76855	7685	51	99926	1959
Belgium	125	414696	3318	265	138453	522	121	122542	1013
France	40	659340	16483	131	471696	3601	128	511386	3995
West Germany	41	693052	16904	198	404511	2043	27	453942	16813
Czech	1	35379	35379	-	-	-	-	-	-
Poland	2	61370	30685	-	-	-	-	-	-
Portugal	1	267401	267401	9	31517	3502	-	-	-
Spain	17	155863	9168	14	197507	14108	5	63185	12637
Italy	9	104597	11622	28	151276	5403	113	482389	4269
Yugoslavia	2	108624	54312	-	-	-	-	-	-
Turkey	13	58287	4484	45	326926	7265	2	15627	7814
Iran	2	200751	100356	6	41161	6860	11	12216	1111
Israel	11	43554	3959	-	-	-	9	66310	7368

Appendix 23 (cont'd)

Type (SITC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Hydraulic and Pneumatic Presses (7151078)									
India	67	571182	8525	22	690878	31403	13	406911	31301
Pakistan	2	29481	14741	13	66820	5140	14	40862	2919
Vietnam	5	61543	12309	-	-	-	-	-	-
Phil. Rep	4	16757	4189	26	22696	873	14	89299	6379
Taiwan	7	20864	2981	-	-	-	10	28160	2816
Japan	115	963418	16916	216	1315099	6079	65	1140211	17542
Australia	50	173493	5783	36	240405	6679	14	211746	15123
Newzealand	11	12660	1151	-	-	-	-	-	-
Ghana	4	76902	19225	19	1002603	52768	-	-	-
Rep S. Afr.	6	225952	37658	-	-	-	16	115926	7245
Nicaragua	-	-	-	4	30681	7670	5	97326	19465
Denmark	-	-	-	19	47954	2524	5	11983	2397
Thailand	-	-	-	3	15220	5073	-	-	-
Egypt	-	-	-	2	93338	46669	2	28545	14273
Sp Af O	-	-	-	4	29272	7318	-	-	-
Guinea	-	-	-	2	21700	10850	-	-	-
Nigeria	-	-	-	15	18901	1260	-	-	-
Handuras	-	-	-	-	-	-	8	16662	2083
Costa Rica	-	-	-	-	-	-	2	16600	8300
Panama	-	-	-	-	-	-	11	28420	2584
Dom Rep	-	-	-	-	-	-	19	11961	630
Trinidad	-	-	-	-	-	-	9	19368	2152
Switzerland	-	-	-	-	-	-	15	158695	10580
USSR	-	-	-	-	-	-	4	71935	17984
Kuwait	-	-	-	-	-	-	2	90675	45338
S. Arabia	-	-	-	-	-	-	21	47925	2282
Burma	-	-	-	-	-	-	1	20750	20750
Korean Rep	-	-	-	-	-	-	5	333209	66642
Other City	81	103104	1273	-	-	-	130	121406	934
Total	1592	11715325	7359	2458	9876510	4018	1891	9169053	4849

Appendix 23 (cont'd)

Type (SITC) Country of Origin	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Mechanical and Manual Presses (7151080)									
Canada	418	2734954	6542	697	3036917	4357	383	1626449	4247
Mexico	150	1142004	7613	112	567771	5069	152	351925	2315
Gautemala	20	35693	1785	-	-	-	6	25662	4277
Salvador	14	18538	1324	-	-	-	-	-	-
Costa Rica	10	25720	2572	6	18826	3138	-	-	-
Colombia	227	56991	251	4	53977	13494	-	-	-
Venezuela	105	292300	2784	39	56465	1448	139	86685	624
Peru	33	32636	989	17	34859	2050	275	16894	61
Chile	11	41125	3739	-	-	-	-	-	-
Brazil	5	196922	39384	172	1585276	9217	7	409635	58519
Argentina	3	72657	24219	3	53975	17991	4	40337	10084
Sweden	63	1070415	16990	-	-	-	13	25185	1937
Denmark	5	15973	3195	3	50184	16278	1	38677	38677
UK	126	752765	5974	114	853145	7484	52	361959	6961
Netherlands	19	110080	5794	28	139895	4996	93	102620	1104
Belgium	22	112443	5111	30	184786	6160	6	234253	39042
France	35	595928	17026	42	351964	8380	22	1308866	59494
West Germany ¹⁴	196040	14003	14003	10	197909	19791	19	149268	7856
Switzerland	6	24411	4068	6	12240	2040	26	37019	1424
Spain	58	3781905	65205	29	2683076	92519	7	97011	13859
Italy	10	479594	47959	43	879094	20444	22	2690856	122312
Turkey	13	66281	5099	13	89084	6853	2	15990	7995
Iraq	9	16488	1832	2	57563	28781	-	-	-
Iran	9	18025	2002	32	86044	2689	21	1219784	58085
India	33	990551	30017	33	616605	1868	10	864033	86403
Phil Rep	18	39104	2172	-	-	-	-	-	-
Japan	44	967693	21993	24	327064	13627	21	1520828	72420
Australia	21	173906	8281	8	123802	15475	-	-	-
Egypt	16	51309	3207	1	83632	83632	-	-	-
Ghana	1	48820	48820	-	-	-	-	-	-

Appendix 23 (cont'd)

Type (SITC) Country of Destination	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Congo	10	63267	6327	-	-	-	-	-	-
Rep S. Afr	37	60788	1643	30	23575	786	70	38745	554
Ecuador	-	-	-	10	20081	2008	12	16264	1355
Uganda	-	-	-	4	20981	5245	-	-	-
Ireland	-	-	-	8	138503	17312	6	112390	18732
Austria	-	-	-	1	44955	44955	-	-	-
Lebanon	-	-	-	1	26097	26097	-	-	-
Hong Kong	-	-	-	14	12121	866	19	21157	1114
Honduras	-	-	-	-	-	-	15	16909	1127
Nicaragua	-	-	-	-	-	-	10	13673	1367
Dom Rep	-	-	-	-	-	-	4	41456	10384
USSR	-	-	-	-	-	-	43	18440	429
Portugal	-	-	-	-	-	-	3	53204	17735
Taiwan	-	-	-	-	-	-	24	18303	763
Other City 106	-	111830	1055	179	148271	829	93	79166	851
Total	1671	14397156	8616	1715	12578747	7354	1530	11653663	7376
Forging Machines, Other than Presses (7151082)									
Canada	100	829769	8298	94	1280078	13618	60	1006545	16776
Mexico	42	516100	87712	35	235655	6733	18	393392	21855
Nicaragua	4	13430	3358	34	22395	659	-	-	-
Jamaica	4	25274	6319	-	-	-	3	15775	5258
Colombia	1	21638	21638	5	19810	3962	5	12447	2489
Venezuela	4	158282	39571	6	108432	18072	3	16318	5439
Chile	10	243181	24318	6	135942	22657	-	-	-
Argentina	3	150740	50256	-	-	-	1	129982	129982
Sweden	2	43297	21698	3	362908	120969	-	-	-
Denmark	2	49680	24840	-	-	-	-	-	-
UK	16	660194	41262	15	280544	18703	23	585286	25447
Ireland	4	43293	10823	-	-	-	-	-	-
Netherlands	8	302794	37849	6	78039	13006	-	-	-

Type (SIPC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US\$	Average value US \$	No.	Value US \$	Average value US \$
Belgium	5	55364	68929	1	15590	15590	2	76061	38031
France	10	670427	67043	5	87413	17483	15	644168	42945
West Germany	15	454247	30283	22	662343	30106	3	27193	9064
Austria	1	22820	22820	-	-	-	-	-	-
Switzerland	1	21462	21462	3	176497	58832	-	-	-
Spain	9	244104	27122	-	-	-	1	15970	15970
Italy	3	204218	68073	5	332619	66524	4	231720	57930
Turkey	1	24058	24058	5	54093	10819	-	-	-
Iran	2	19725	9862	1	34000	34000	-	-	-
India	66	1769930	26817	18	771652	42870	10	307995	30800
Pakistan	4	154498	38624	8	88948	11118	-	-	-
Japan	26	2074623	80639	6	272515	45419	25	1502213	60089
Australia	20	532032	26601	6	312220	52037	8	312231	39029
New Zealand	3	249881	83293	94	253477	2697	-	-	-
Rep S. Afr	5	1135131	227026	2	170500	82250	1	69663	69663
Brazil	-	-	-	6	62152	10359	24	741762	30907
Korean Rep	-	-	-	2	96560	49280	-	-	-
Nigeria	-	-	-	3	28246	9415	-	-	-
Phil Rep.	-	-	-	-	-	-	3	19726	6575
Other City	27	29350	1087	32	33485	1046	19	34040	1792
Total ..	398	10741532	26989	423	5976113	14128	228	6142487	26941
Metal Container-making Machines (7151084)									
Canada	190	1035555	5450	307	906783	2954	303	926941	3059
Mexico	12	99970	8331	68	753174	11076	71	550091	4931
Venezuela	16	160195	10012	10	41242	4124	10	27359	2756
United King.	20	330374	19018	7	30986	4427	47	347534	7394
France	9	23816	2646	9	118396	13155	21	45279	2156

Type (SITC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
West Germany	8	30685	3836	3	24327	8109	19	109804	5779
Italy	5	308516	61703	-	-	-	-	-	-
Phil. Rep.	3	48777	15592	4	142579	35644	5	70185	14037
New Zealand	3	37693	12564	-	-	-	-	-	-
Rep S. Afr	11	49895	4536	3	34908	11636	15	542147	36143
Belgium	-	-	-	26	318483	12249	-	-	-
India	-	-	-	2	192691	96345	-	-	-
Guatemala	-	-	-	-	-	-	11	175723	15975
Dom. Rep.	-	-	-	-	-	-	4	81506	20377
F.W. Ind	-	-	-	-	-	-	3	95600	31867
Brazil	-	-	-	-	-	-	1	18000	18000
Japan	-	-	-	-	-	-	15	92214	6148
Australia	-	-	-	-	-	-	1	108000	108000
Congo	-	-	-	-	-	-	10	34308	3451
Other City	29	56448	1946	22	61405	2791	8	14570	1821
Total	306	2229924	7287	461	2624974	5694	544	3039261	5587
Metalworking Machines - New (7151086)									
Canada	396	4045469	2894	300	6025399	2620	2010	4307966	2143
Mexico	230	1150222	5001	234	783217	3347	477	1060965	2224
Guatemala	18	20656	1148	9	35231	3914	14	14417	1030
Salvador	54	68765	1273	-	-	-	12	31307	2609
Jamaica	13	21494	1653	41	44374	1082	13	36950	2342
Nicaragua	43	55403	1298	43	66415	1544	-	-	-
Trinidad	20	25894	1295	16	12825	802	-	-	-
Colombia	50	58143	1162	82	133140	1624	14	30937	2210
Venezuela	578	363652	629	200	541774	2709	51	152616	2992
Ecuador	11	18081	1644	18	24520	1362	10	11934	1193

Type (SIRC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Peru	63	134411	2134	55	71023	1291	31	41214	1329
Bolivia	47	38687	823	-	-	-	-	-	-
Chile	85	270244	3179	30	57428	1914	111	122999	1108
Brazil	71	315227	4439	158	680700	4308	35	275703	7877
Uruguay	92	26969	293	8	42260	5282	-	-	-
Argentina	49	74003	1510	169	1192067	7053	14	793002	56643
Sweden	84	499669	5948	261	402074	1540	111	189754	1709
Norway	29	58068	2002	4	42989	10747	15	45175	3012
Finland	41	40405	985	9	44913	4990	5	11928	2384
Denmark	21	16747	797	13	15853	1219	13	21506	1654
UK	993	2185760	2201	971	2947607	3036	326	2582940	7923
Ireland	9	52750	5861	14	59367	4240	5	14505	2901
Netherlands	152	253777	1669	142	249393	1756	69	105702	1532
Belgium	167	172361	1032	101	255730	2532	79	102921	1303
France	441	1199110	2719	253	1117768	4418	111	860257	7930
W. Germany	471	1107818	2352	631	1159010	2154	120	895682	7464
Switzerland	70	188653	2695	171	192950	1128	28	81074	2896
Spain	171	378674	2214	78	198501	2545	27	76295	2826
Italy	183	381968	2087	712	1077702	1514	146	532347	3648
Turkey	9	93231	10359	5	14006	2801	-	-	-
Iran	23	27836	1210	-	-	-	13	60976	4690
Israel	136	53049	390	30	16410	547	10	48490	4349
S. Arabia	11	14906	1355	-	-	-	-	-	-
India	190	689453	3629	77	146778	1906	31	299444	9659
Pakistan	37	154587	4178	-	-	-	-	-	-
Phil. Rep	54	77486	1435	32	33371	1043	47	106948	2275
Hong Kong	46	40840	889	-	-	-	-	-	-
Taiwan	23	27962	1216	-	-	-	14	78502	5593
Japan	348	1612192	4633	433	953838	2203	112	916167	8180
Australia	343	1028713	2999	268	681079	2541	72	463674	6440

Appendix 23 (cont'd)

Type (SITC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
New Zealand	18	38294	2127	17	16636	979	-	-	-
Egypt	62	63733	1028	-	-	-	-	-	-
Sp. Afr	2	14385	7193	-	-	-	-	-	-
Nigeria	108	53709	497	-	-	-	3	12173	4058
Congo	10	16491	1649	-	-	-	-	-	-
Ethiopia	12	12394	1033	-	-	-	-	-	-
Rep S. Afr	246	579914	2357	47	81182	1727	59	339777	5759
Other City	255	108266	425	193	149324	774	126	98657	783
Dom. Rep	-	-	-	6	12007	2001	8	29143	3643
Guyana	-	-	-	4	13321	3330	-	-	-
Austria	-	-	-	31	37581	1212	10	15720	1572
Greece	-	-	-	9	13262	1473	19	28440	1497
Canary Is.	-	-	-	22	14257	648	-	-	-
Sierra Leone	-	-	-	27	13418	497	-	-	-
Ghana	-	-	-	18	34644	1925	-	-	-
O W Afr	-	-	-	21	12732	606	-	-	-
Kenya	-	-	-	23	14000	609	-	-	-
Costa Rica	-	-	-	-	-	-	10	12034	1203
Panama	-	-	-	-	-	-	10	42596	4260
Lw WW I	-	-	-	-	-	-	5	15179	3036
Surinam	-	-	-	-	-	-	1	11750	11750
Poland	-	-	-	-	-	-	3	186520	62173
Yugoslavia	-	-	-	-	-	-	24	133181	5549
S. Vietnam	-	-	-	-	-	-	39	29220	729
Laos	-	-	-	-	-	-	6	22074	3679
Kor. Rep	-	-	-	-	-	-	9	76396	8266
Total	7565	17930521	2364	286	19932076	2496	4478	15444720	3449

Type (STTC) Country of Destination	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Metal Working Machine Tools - Used (Whether or not Re-built) (7151088)									
Canada	691	1135168	1932	767	1730063	2256	391	1610424	1158
Mexico	688	2750333	9600	403	1258256	3122	442	1390805	3147
Guatemala	23	25041	1089	-	-	-	-	-	-
Salvador	10	12820	1282	38	69333	1825	-	-	-
Costa Rica	4	19650	4912	-	-	-	-	-	-
Panama	92	38430	418	28	83800	2993	15	41166	2744
Jamaica	10	21048	2105	-	-	-	6	14530	2422
Trinidad	7	54495	7785	-	-	-	14	24200	1729
Colombia	159	46712	294	6	14905	2484	1	154000	154000
Venezuela	30	123261	4109	14	35863	2562	29	86826	2994
Peru	13	25936	1995	10	12272	1227	23	12242	532
Chile	45	19040	423	-	-	-	9	108194	12021
Brazil	19	243002	12789	-	-	-	18	31471	1748
Argentina	19	252527	14140	14	61181	4370	-	-	-
Sweden	6	12743	2124	-	-	-	-	-	-
UK	297	518799	1747	379	306686	809	126	252969	2008
Ireland	5	15912	3182	-	-	-	-	-	-
Netherlands	5	12488	2497	13	39420	3032	4	17300	4325
Belgium	49	94977	1938	26	13835	532	16	39826	2489
France	57	135637	2344	154	168453	1094	33	147493	4469
W. Germany	43	121643	2829	68	79683	1172	9	28547	3172
Spain	6	41391	6898	5	14388	2878	-	-	-
Portugal	18	47849	2658	2	15000	7500	-	-	-
Italy	63	32071	509	83	29082	350	180	124800	693
Greece	118	35781	303	-	-	-	-	-	-
Israel	11	50210	5382	9	25532	2837	2	67300	33650
India	211	1569771	7439	65	561370	8636	-	-	-
Pakistan	10	66716	6372	-	-	-	-	-	-
Phil. Rep	26	39163	1506	-	-	-	5	11075	2215
Taiwan	19	12947	681	10	56300	5630	-	-	-

Type (SITC) Country of Destination	1965			1966			1967		
	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$	No.	Value US \$	Average value US \$
Japan	33	37427	1124	38	28932	761	-	-	-
Australia	41	224741	5481	39	38049	976	63	226629	3597
Nigeria	24	49478	2061	13	22232	1710	-	-	-
Rep S. Afr	159	443813	2791	16	15346	959	30	161550	5385
Other City	95	38545	406	120	84511	704	142	74155	522
Nicargua	-	-	-	10	52775	5277	-	-	-
Haiti	-	-	-	2	15000	7500	-	-	-
New Zealand	-	-	-	19	34275	1804	-	-	-
Dem. Rep	-	-	-	-	-	-	17	12325	724
Surinam	-	-	-	-	-	-	16	21066	1317
Kuwait	-	-	-	-	-	-	1	15517	15517
Hong Kong	-	-	-	-	-	-	13	63840	4911
Total	3105	8578565	2763	2351	4866542	2070	2605	4738250	1819

S. I. C. 19 : ORDNANCE AND ACCESSORIES

Establishments engaged in manufacturing artillery, small arms, and related equipment; ammunition; tanks and specialised tank parts; sighting and fire control equipment; and miscellaneous ordnance and accessories not elsewhere classified.

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967)*	Iron Age (Nov., 1966)*	Machine & Tool Blue Book (May, 1968)*	Machinery (May, 1968)*	Metal- Working (May, 1967)*	Modern Machine Shop (Nov., 1967)*	Production (May, 1968)*	Steel (May, 1967)*	Tooling & Production (Nov., 1967)*
Under 20 or size unavailable	141	9	2	10	35	5	34	**5	0	0
20 - 49	35	11	11	20	35	5	34	**2	14	13
50 - 99	26	25	8	12	2	13	40	3	10	6
100 - 249	31	44	23	28	26	43	40	49	26	16
250 - 499	23	15	15	20	26	43	40	9	9	14
500 & over	96	86	72	62	81	77	75	92	72	65
Central & district offices and auxiliary units		13	7						9	
TOTAL	352	177	138	152	144	138	149	151	140	114

*Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 25 : FURNITURE AND FIXTURES

Establishments engaged in manufacturing household, office, public building, and restaurant furniture; and office and store fixtures.

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967)*	Iron Age (Nov., 1966)*	Machine & Tool Blue Book (May, 1968)*	Machinery (May, 1968)*	Metal- Working (May, 1967)*	Modern Machine Shop (Nov., 1967)*	Production (May, 1968)*	Steel (May, 1967)*	Tooling & Production (Nov., 1967)*
Under 20 or size unavailable	6,106	8	1	62	21	22	391	**4	3	5
20 - 49	1,673	149	188	131	63	186	653	**10	140	70
50 - 99	828		205	131				93	203	82
100 - 249	605	238	205	112	177	228		281	198	88
250 - 499	247		79	69					76	67
500 & over	124	46	48	35	39	45	52	51	52	37
Central & district offices and auxiliary units		2	24						9	
TOTAL	9,583	443	750	540	300	481	1,096	444	681	349

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**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 33 : PRIMARY METAL INDUSTRIES

Establishments engaged in the smelting and refining of ferrous and nonferrous metals from ore, pig, or scrap; in the rolling, drawing and alloying of ferrous and nonferrous metals; in the manufacture of castings, forgings, and other basic products of ferrous and nonferrous metals; and in the manufacture of nails, spikes, and insulated wire and cable.

Plant Size by Number of Employees	Total Universe as Established by County Business (Patterns (1967)	American Machinist (Nov., 1967)*	Iron Age (Nov., 1966)*	Machining & Tool Blue Book (May, 1968)*	Machinery (May, 1968)*	Metal- Working (May, 1967)*	Modern Machine Shop (Nov., 1967)*	Production (May, 1968)*	Steel (May, 1967)*	Tooling & Production (Nov., 1967)*
Under 20 or size unavailable	2,537	72	48	185	73	30	412	**2	67	12
20 - 49	1,346	356	890	366	73	30	412	**0	830	210
50 - 99	852		783	266	60	36		12	750	187
100 - 249	910	605	799	381	391	91	1,079	117	915	307
250 - 499	435		404	221					522	206
500 & over	486	360	473	333	201	215	533	76	928	346
Central & district offices and auxiliary units		35	507						381	
TOTAL	6,566	1,428	3,904	1,752	725	372	2,024	207	4,393	1,270

* Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates of the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

** PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 34 : FABRICATED METAL PRODUCTS
(Except Ordnance, Machinery, and Transportation Equipment)

Establishments engaged in fabricating ferrous and nonferrous metal products such as metal cans, tinware, hand tools, cutlery, general hardware, non-electric heating apparatus, fabricated structural products, metal stampings and a variety of metal and wire products not elsewhere classified.

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967) *	Iron Age (Nov., 1966) *	Machine & Tool Blue Book (May, 1968) *	Machinery (May, 1968) *	Metal- Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel (May, 1968) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable	15,492	148	97	1,572	626	1,037	5,436	**19	28	108
20 - 49	5,353	2,605	3,380	4,888	687	2,285		**122	2,901	1,285
50 - 99	2,557		2,352	2,639				868	2,284	950
100 - 249	1,765	2,267	1,744	1,944	1,719	2,500	4,902	2,183	1,863	996
250 - 499	601		562	594					683	435
500 & over	365	459	393	398	399	452	464	438	453	364
Central & district offices and auxiliary units		64	336						135	
TOTAL	26,133	5,543	8,864	12,035	3,431	6,274	10,802	3,630	8,347	4,138

* Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 35 : MACHINERY, EXCEPT ELECTRICAL

Establishments engaged in manufacturing machinery and equipment, other than electrical equipment (S.I.C. 36) and transportation equipment (S.I.C. 37). Machines powered by built-in or detachable motors ordinarily are included in this group, with the exception of electrical household appliances (S.I.C. 36). Portable tools, both electric and pneumatic powered, are included in this group, but hand tools are classified in S.I.C. 34

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967) *	Iron Age (Nov., 1966) *	Machine & Tool Blue Book (May, 1968) *	Machinery (May, 1968) *	Metal- Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel (May, 1968) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable	24,896	694	112	4,283	1,804	1,683	9,801	** 41	31	380
20 - 49	5,730	4,830	3,317	5,317				**113	2,884	4,030
50 - 99	2,232		2,098	2,488	957	2,134		778	2,096	1,208
100 - 249	1,584	3,012	1,476	1,844	1,968	2,596	4,901	2,197	1,657	1,119
250 - 499	668		599	711					716	599
500 & over	691	1,139	645	727	772	952	919	934	838	725
Central & district offices and auxiliary units		116	432						229	
TOTAL	35,801	9,791	8,679	15,370	5,501	7,365	15,621	4,063	8,451	6,061

* Unit audits are voluntary and are not required by EPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made.

Audit statements indicated here are the most current published and available at this date.

** PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 36 : ELECTRICAL MACHINERY, EQUIPMENT, & SUPPLIES

Establishments engaged in manufacturing machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilisation of electrical energy. The manufacture of household appliances is included in this group, but industrial machinery and equipment powered by built-in or detachable electric motors is classified in S.I.C. 35

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967) *	Iron Age (Nov., 1966) *	Machinist & Tool Blue (May, 1968) *	Machinist (May, 1968) *	Metal- Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel (May, 1967) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable	4,656	155	25	528	369	116	1,843	**40	11	18
20 - 49	1,722	957	776	1,695	776	116	1,843	**71	622	393
50 - 99	1,128		845	1,244	234	940	2,802	431	753	392
100 - 249	1,134	1,698	980	1,288	1,193	1,710		1,804	955	599
250 - 499	646		524	614					586	397
500 & over	813	972	692	781	757	914	849	1,027	779	692
Central & district offices and auxiliary units		123	206						120	
TOTAL	10,099	3,905	4,048	6,150	2,553	3,680	5,494	3,373	3,826	2,488

* Unit audits are voluntary and are not required by EPA. They may therefore be made at whatever frequency and dates and publisher desires and exact comparisons for identical periods cannot be made.

Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 37 : TRANSPORTATION EQUIPMENT

Establishments engaged in manufacturing equipment for transportation of passengers and cargo by land, air, and water. Important products produced by establishments classified in this S.I.C. include motor vehicles, aircraft, ships, boats, railroad equipment, and miscellaneous transportation equipment such as motorcycles, bicycles, and horse drawn vehicles

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967) *	Iron Age (Nov., 1966) *	Machinry & Tool Blue (May, 1968) *	Machinry (May, 1968) *	Metal- Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel (May, 1967) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable	3,787	132	6	323	288	90	1,265	**24	17	10
20 - 49	1,154	626	541	975				**28	429	244
50 - 99	817		544	676	163	599		220	482	228
100 - 249	645	860	495	652	607	858	1,587	802	518	307
250 - 499	311		226	309					276	182
500 & over	507	711	474	502	572	585	651	639	668	474
Central & district offices and auxiliary units		91	169						149	
TOTAL	7,221	2,430	2,455	3,437	1,630	2,132	3,503	1,713	2,540	1,445

* Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 38 : PROFESSIONAL, SCIENTIFIC, & CONTROLLING INSTRUMENTS
(Photographic and Optical Goods; Watches and Clocks)

Establishments engaged in manufacturing mechanical measuring, engineering, laboratory, and scientific research instruments; optical instruments and lenses; surgical, medical and dental instruments, equipment and supplies; ophthalmic goods; photographic equipment and supplies; and watches and clocks.

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967)*	Iron Age (Nov., 1966)*	Machine & Tool Blue Book (May, 1968)*	Machinery (May, 1967)*	Metal- Working (May, 1967)*	Modern Machine Shop (Nov., 1967)*	Production (May, 1968)*	Steel (May, 1967)*	Tooling & Production (Nov., 1967)*
Under 20 or size unavailable	2,590	30	10	243	144	43	672	**5	3	10
20 - 49	592	364	233	666				**21	215	167
50 - 99	347		239	388	99	314		156	260	152
100 - 249	289	420	222	366	332	421	798	475	258	178
250 - 499	165		117	160					135	112
500 & over	143	172	127	184	154	172	174	189	140	149
Central & district offices and auxiliary units		24	44						22	
TOTAL	4,126	1,010	992	2,007	729	950	1,644	846	1,033	768

* Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made.

Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

S. I. C. 39 : MISCELLANEOUS MANUFACTURING INDUSTRIES

Establishments primarily engaged in manufacturing products not classified in any other manufacturing major group. Industries in this group fall into the following categories: jewelry, silverware and plated ware; musical instruments; toys, sporting and athletic goods; pens, pencils, and other office and artists' materials; buttons, costume novelties, miscellaneous notions; brooms and brushes; morticians' goods; and other miscellaneous manufacturing industries.

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machine (Nov., 1967) *	Iron Age (Nov., 1966) *	Machine & Tool Blue (May, 1968) *	Machinery (May, 1967) *	Metal Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel (May, 1967) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable	9,429	12	3	252	48	29	1,068	**0	2	10
20 - 49	2,046	294	327	1,188				**12	295	171
50 - 99	935		325	655	74	371		92	246	128
100 - 249	555	304	289	497	292	472	1,083	319	271	154
200 - 499	198		124	178					116	89
500 & over	90	87	71	104	86	92	125	97	81	83
Central & district offices and auxiliary units		5	23						7	
TOTAL	13,253	702	1,162	2,874	500	964	2,276	520	1,018	635

* Unit audits are voluntary and are not required by BFA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

THE TOTAL METALWORKING MANUFACTURING MARKET

A comparison of plant coverage in the total metalworking manufacturing universe
(S.I.C. 19, 25, 33, 34, 35, 36, 37, 38, and 39)

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967) *	Iron Age (Nov., 1966) *	Machine & Tool Blue Book (May, 1968) *	Machinery (May, 1968) *	Metal Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel (May, 1967) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable	69,634	1,260	304	7,458	3,408	3,055	20,922	**140	162	553
20 - 49	19,651	10,216	9,663	15,246				**379	8,330	4,583
50 - 99	9,722		7,399	8,499	2,339	6,878		2,658	7,085	3,333
100 - 249	7,518		6,233	7,112			17,845	8,227	6,661	3,763
250 - 499	3,294	9,448	2,650	2,876	6,705	8,919			3,119	2,101
500 & over	3,315	4,032	2,995	3,126	3,061	3,504	3,842	3,543	4,011	2,935
Central & district offices and auxiliary units		473	1,748						1,061	
TOTAL	113,134	25,429	30,992	44,317	15,513	22,356	42,609	14,947	30,429	17,268

* Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

**PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

NON-METALWORKING MANUFACTURING UNITS

A comparison of plants covered that are not engaged in metalworking manufacturing.

Plant Size by Number of Employees	Total Universe as Established by County Business Patterns (1967)	American Machinist (Nov., 1967) *	Iron Age (Nov., 1966) *	Machine & Tool Blue Book (May, 1968) *	Machinery (May, 1967) *	Metal Working (May, 1967) *	Modern Machine Shop (Nov., 1967) *	Production (May, 1968) *	Steel May, 1967) *	Tooling & Production (Nov., 1967) *
Under 20 or size unavailable								**		
20 - 49								**		
50 - 99										
100 - 249										
250 - 499										
500 & Over										
Central & district offices and auxiliary units										
TOTAL	2,098	2,691	727	1,273	819	2,606	261	1,085	619	

* Unit audits are voluntary and are not required by BPA. They may therefore be made at whatever frequency and dates the publisher desires and exact comparisons for identical periods cannot be made. Audit statements indicated here are the most current published and available at this date.

** PRODUCTION expresses unit sizes as less than 25 and 25-49. All other categories are comparable.

List of Interviews made by Survey Team

U. S. A

Dates of Visit: 1.5.1968 to 24.6.1968

Team Members:

IIMC

DCo

Dr. (Mrs.) L. Mohan
Mr. Mark Frankenna

Dr. R. Singh

<u>Name of Firm/Organization</u>	<u>Persons Interviewed</u>	<u>Designation</u>
(A) <u>Manufacturers</u>		
1. Verson Allsteel Press Co. 1355, East 93rd St. Chicago, Illinois. 60619	Mr. Walter Johnson	Vice-President, Sales.
2. Harron Richard & McCone Co. of Northern California 2050 Bryant St. San Francisco, Calif 94110	Mr. J.O. Ellison	President
3. Dreis & Krump Manufacturing Company, 7400 South Leornis Bonlevard Chicago, Illinois 60636	Mr. Alidor J. DeWolf	President
4. Motch & Merryweather Machinery Company, 125C East 222nd Street, Cleveland, Ohio, 44117	(1) Mr. Clare R. Kubck (2) Mr. Tom La Porte	President Sales Mfg. Division
5. Warner & Swasey Company 5701 Garnegie Avenue Cleveland, Ohio, 44103	(1) Mr. Thomas Stellwell (2) Mr. W.M. Orebaugh (3) Mr. Milan Bagacka	Vice-President Sales Engg. Dept. Sales Engg. Dept. Sales Terretory Manager
6. The R.K. LeBlond Machine Tool Madison & Edwards Roads, Cincinnati, Ohio, 45208	(1) Mr. Frank L. Hamlin (2) Mr. George C. Marakas	Supervisor Engine Lathe Sales Engg. Sales Manager

<u>Name of Firm/Organization</u>	<u>Persons Interviewed</u>	<u>Designation</u>
7. Cincinnati Milling Machine Co. Oakley, Cincinnati, Ohio - 45209	(1) Mr. Don Clark (2) Mr. Swadesh Dhinjra	Sales Engg. Dept. Sales Project Manager
8. The Lodge & Shipley Co. 3055 Coleraon Avenue Cincinnati, Ohio, 45225	(1) Mr. T.T. Kling (2) Mr. Roy M Nelson	Executive Vice President Vice President, Marketing
9. EX-CELL-O Corporation 1200 Oakmen Blvd & Hamelton Avenue, P.O. Box 386, Detroit, Michigan, 48232	(1) Mr. Donald H. McIoer (2) Mr. John F. Kraushaar (3) Mr. J.S. Orain (4) Mr. W.N. Burkart	First Vice President, Machine Tool Group Export Sales Engineer (Machine Tools) Marketing Manager Vice President Machine Tool Sales.
10. Burgmaster Corporation, Division of Houdaille Industries Inc 13900 So. Broadway, Los Angeles, California, 90061	Mr. Dean Stread	Asst. Western Sales Manager
11. Thiem Industries Inc. 1918 W. Artesia Blvd Torrance, California	Mr. Charles E Burns	Vice President Marketing
(B) <u>Distributors</u>		
1. Given International, 3855 Santa Fe Ave. Los Angeles, Calif. 90058	(1) Mr. Given (2) Mr. Williams	President Marketing Manager
2. Global Development & Design Co. 9348, Santa Monica Boulevard, Beverly Hills, Calif.	Mr. E. Klaus	President

	<u>Name of Firm/Organization</u>	<u>Persons Interviewed</u>	<u>Designation</u>
3.	Maruboni - Iida (America) 200 Park Avenue, New York, N.Y.	Mr. Richard Bernett	
4.	Glaubinger Machinery Co. 234 Emmet St. Newark, N.J	Mr. Norman C. Glaubinger	President
5.	General Machinery Corp. 140 Federal St. Boston, Mass.	Mr. Erhardt	
6.	Kanomatsu-Gosho (USA) Inc. Machine Tool Division 1 Whitchall Street New York, N.Y. 10004	Mr. Zweir	
7.	Hunter Douglas International New York, N.Y.	(1) Mr. Hugh Hauck (2) Mr. Zeh	General Manager Sales
8.	Machine Tool International Inc. 757 Third Avenue New York, N.Y.	Mr. Otto Toitler	Vice-President
9.	Hindustan Machine Tools Ltd. 527 Madison Avenue New York, N.Y. 10022	Mr. Y. Navaneetham	Sales Manager
10.	Machinery International Corp. 315 S. Gree Street, Chicago, Illinois 60607	Mr. Jack Gehringer	Sales Manager Machine Tools
11.	Hindustan Machine Tools Ltd. 3379 Rowena Avenue Los Angeles, California	Mr. Ramani Rajaram	Sales/Service Engineer
12.	Ataka America Inc. (Vicle-Blackwell Kluger Inc) 633 Third Avenue New York, New York 10017	Mr. T. Sawa	Vice-President, Manager, Machinery Dept.
13.	American Machine Tool Export Associates 30 Church Street New York, New York 10017	Mr. Schwarting	President

	<u>Name of Firm/Organization</u>	<u>Persons Interviewed</u>	<u>Designation</u>
(C)	<u>Users</u>		
1.	Warner & Swasey Co. Ltd. Cleveland, Ohio	Mr. Bagacka	Plant Supervisor
2.	Westinghouse Electric Inc. Pittsburgh, Pa	(1) Mr. Paul C. Hannah (2) Mr. Fritzgibbon	Head (Mfg.) Asst. Head (Mfg.)
3.	Harris Intertype Company 55 Public Square Cleveland, Ohio	Mr. R.C. Dyke	Vice-President, Manufacturing
4.	Krueger & Hudepchl Inc. 1041 Spring Grove Avenue Cincinnati, Ohio	Mr. Hudepchl	Partner
5.	Kiechlet Manufacturing Co. Inc. 1068 Summer Street, Cincinnati, Ohio	Mr. M. Tittle	Manager
6.	Henry Ford Community College 5101 Ford Road and Evergreen Dearborn, Michigan	(1) Mr. M.O. Deston (2) Mr. M. Mettley	Tech. Coordinator Distributor in Machine Tools
7.	Ferris State College Big Rapids, Michigan		
8.	Ford Motor Company Central Office Building Corner of Michigan & Southfield Dearborn, Michigan 48121	(1) Mr. J. A. Davis (2) Mr. R.E. Davis (3) Mr. Bond	Senior Buyer Machinery & Special Tools Purchasing Dept. Director Manufacturing Engineering Office Educational Affairs
9.	Huck Manufacturing Company 2500 Bellevue Avenue Detroit, Michigan 48207	Mr. W.N. Koeller	Manager, Manufacturing Engg.
10.	Snyder Corporation 3400 Lafayette Avenue Detroit, Michigan 48207	Mr. John J. Konkall Jr.	Director of Engineering

<u>Name of Firm/Organization</u>	<u>Persons Interviewed</u>	<u>Designation</u>
11. Size Control Company Division of American Gage and Machine Company 2500 W. Washington Blvd. Chicago, Illinois 60612	Mr. Peter J. Sommer	Vice-President and General Manager
12. Arwood Corporation 3037 South Vail Avenue Los Angeles California		Works Manager
(D) <u>Government Officials/Association</u>		
1. Smaller Manufacturers Council Affiliate of The Chamber of Commerce of Greater Pittsburgh Chamber of Commerce Building Pittsburgh, Pa 15219 Pittsburgh	Mr. Earl. W. Erikson	Executive Director
2. Associated Equipment Distributors 615 West 22nd Street Oakbrook, Illinois 60523	Mr. F. Skidmore	Machinery Div. Director of Service- Industry
3. American Machine Tool Distributors' Association 1500 Massachusetts Avenue N.Y. Washington D.C. 20005	Mr. James C. Kelley	Executive Vice-President
4. National Machine Tool Builders Association 2139 Wisconsin Avenue Washington, D.C. 20007	Mr. James A. Gray	Executive Vice-President
5. Indian Investment Centre New York	Mr. P.C. Naik	
6. U.S. Department of Commerce 14th Street Washington D.C. 20230	(1) Mr. R.J. Huneberger	Chief Metal Working Division, Business and Defence Service Administration

<u>Name of Firm/Organization</u>	<u>Persons Interviewed</u>	<u>Designation</u>
	(2) Mr. Pritchard	Office of International, Bureau of International Commerce
	(3) Mr. Lill	India Desk, Office of International Regional Economics, Bureau of International Commerce, USA Commercial Offices
7. Embassy of India 2017 Massachusetts Avenue, N.W., Washington, D.C.	Mr K.D. Sharma	First Commercial Secretary.
(E) <u>Others</u>		
1. ASTME 1968 National Tool Exposition, Civil Centre, Philadelphia, Pa. Sponsored by: American Society of Tool and Manufacturing Engineers 20501 Ford Road Dearborn, Michigan 48128		
2. <u>American Machinist</u> McGraw-Hill Publishing Co. 330 West 42nd St. New York, NY 10036	(1) Mr. Anderson Ashburn (2) Mr. Richard Berg	Editor Associate Editor
3. <u>Metal Working News</u> 7 East 12th St. New York, New York	Mr. Albert Mari	

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